

29

**STANDING COMMITTEE ON AGRICULTURE
(2015-2016)**

SIXTEENTH LOK SABHA

**MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION)**

TWENTY NINTH REPORT

**IMPACT OF CHEMICAL FERTILIZERS AND PESTICIDES ON AGRICULTURE AND
ALLIED SECTORS IN THE COUNTRY**



**LOK SABHA SECRETARIAT
NEW DELHI
August, 2016/Shravana, 1938 (Saka)**

**TWENTY NINTH REPORT
STANDING COMMITTEE ON AGRICULTURE
(2015-2016)**

(SIXTEENTH LOK SABHA)

**MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION)**

**IMPACT OF CHEMICAL FERTILIZERS AND PESTICIDES ON AGRICULTURE AND
ALLIED SECTORS IN THE COUNTRY**

Presented to Lok Sabha on	11.08.2016
Laid on the Table of Rajya Sabha on	11.08.2016



**LOK SABHA SECRETARIAT
NEW DELHI
AUGUST, 2016/SHRAVANA, 1938 (SAKA)**

COA No. 345

Price : Rs.

© 2016 By Lok Sabha Secretariat

Published under Rule 382 of the Rules of Procedure and Conduct of Business in Lok Sabha (Fourteenth Edition) and Printed by

<CONTENTS>

PAGE No.

COMPOSITION OF THE COMMITTEE (2014-15).....	
INTRODUCTION.....	

REPORT

PART-I

CHAPTER I	INTRODUCTION	1
	Green Revolution Impact on Agricultural Growth in India	2
	Decadal Growth Rate of Net Sown Area in the Country	4
	Availability of Agricultural Land in the Country	5
	Long Term Impact of the Strategies adopted for enhancing productivity during the Green Revolution in the Country	8
CHAPTER II	Improper Fertilizer Use and Decline in Crop Productivity	11
	Fertilizer Use and Environmental Concerns	12
	i). Human and Animal Health disorders	12
	ii). Pollution of Water Resources	13
	iii). Greenhouse Gas Emission	13
CHAPTER III	Pattern of Fertilizes Use, Fertilizer Subsidy and Integrated Nutrient Management	18
	Requirement, Availability and Import of Fertilizer	18
	Pattern of Fertilizer Consumption	19
	Per Hectare use of chemical fertilizers	20
	State-wise ratio of Consumption of chemical fertilizers (NPK)	21
	Crop-wise Use of Fertilizers	23
	Integrated Nutrient Management	25
	Soil Health Card Scheme	29
	Soil Testing Labs in Country	30
	Organic Farming	33
	Incentives to Encourage Organic Farming	35
	Certification of Organic Farming Produce	35
	Use of Bio-fertilizers	35
	Policy for Promotion of Use of Bio-Fertilizers	37
	Subsidy Policy on Fertilizers	37
	Subsidy on Urea	38
	Fertilizer Management Strategies and Nutrient Based Subsidy for P&K Fertilizers	39
	Certification for Fertilizers	43
CHAPTER IV	Use of Pesticides in Agriculture Sector in India and Its Impact	46
	Benefits of Use of Pesticides	46
	Use of Pesticides in India	47
	Import of Pesticides	50
	Impacts of Pesticides on Agriculture and Allied sector in the Country and on human health	52
	Pesticides Residue in Food Products	54
	Study/Research on Impact of Pesticides on Human Health	57
	Presence of Pesticides in Human Blood Samples	58
	Effects of Improper Use of Chemical Fertilizers, Pesticides and other Potential Pollutants on Occupational Groups	59
	Use of DDT in Agriculture	62
	Insecticides Act 1968	62
	Role of ICMR on the Board of Central Insecticides Board	67
	Integrated Pest Management	68
	Allocation for Integrated Pest Management	70

Training Programmes on Integrated Pest Management	72
Use of Protective Gears by the Farmers During Sprinkling of Pesticides in Fields.	75

PART-II

RECOMMENDATIONS/OBSERVATIONS OF THE COMMITTEE	76
---	----

ANNEXURE

Annexure-I	AICRP on Long Term Fertilizer Experiments (LTFE)	99
Annexure-II	State-wise Number of Soil Testing Laboratories in the Country, their Analyzing Capacity and Utilization during 2012-13	101
Annexure-III	Workshops and Training programmes organized by ICAR Institutes on Integrated Nutrient Management in the Country during the last five years? Please provide State-wise details.	102
Annexure-IV	IPNS Packages for Dominant Cropping System in Different Agro-Climatic Region of the Country	104
Annexure-V	Notification dated 01 st August, 2011, Ministry of Health and Family Welfare.	111
Annexure-VI	NIOH Studies	130
Annexure-VII	Insecticides Refused for Registration by the Registration Committee	134
Annexure-VIII	Insecticides/Insecticides Formulations Banned in India	135
Annexure-IX	Insecticides Restricted for Use in the Country	138
Annexure-X	List of Pesticides/Formulations which are Banned	141

APPENDICES

I.	Minutes of the 10 th Sitting of the Committee held on 10.12.2014	143
II.	Minutes of the 11 th Sitting of the Committee held on 16.12.2014	146
III.	Minutes of the 13 th Sitting of the Committee held on 05.01.2015	149
IV	Minutes of the 33 rd Sitting of the Committee held on 26.08.2015	152
V	Extracts of Minutes of the 29 th Sitting of the Committee held on 08.08.2016	155

COMPOSITION OF THE COMMITTEE ON AGRICULTURE (2014-15)
Shri Hukm Deo Narayan Yadav - Chairperson

MEMBERS
LOK SABHA

2. Shri Sanganna Amarappa
3. Prof. Ravindra Vishwanath Gaikwad
- *4. Prof. Richard Hay
5. Shri Nalin Kumar Kateel
6. Md. Badaruddoza Khan
7. Shri C. Mahendran
8. Dr. Tapas Mandal
9. Shri Janardan Mishra
10. Shri Ajay Nishad
11. Shri Dalpat Singh Paraste
12. Shri Nityanand Rai
13. Shri Mukesh Rajput
14. Shri Konakalla Narayana Rao
15. Shri C.L. Ruala
16. Shri Arjun Charan Sethi
17. Shri Satyapal Singh
18. Shri Virendra Singh
19. Shri Jai Prakash Narayan Yadav
20. Shri Dharmendra Yadav
21. Shri B. S. Yeddyurappa

RAJYA SABHA

22. Shri A.W. Rabi Bernard
23. Shrimati Renuka Chowdhury
24. Sardar Sukhdev Singh Dhindsa
25. Shri Janardan Dwivedi
26. Shri Vinay Katiyar
27. Shri Mohd. Ali Khan
28. Shri Rajpal Singh Saini
29. Shri Ram Nath Thakur
30. Shri Shankarbhai N. Vegad
31. Shri Darshan Singh Yadav

**Nominated as a Member of Committee on Agriculture vide Lok Sabha Bulletin Part-II No. 2303 dated 17.08.2015 vice Shri Kadiyam Srihari who ceased to be the Member of the Committee on his resignation from Lok Sabha w.e.f 11.06.2015 vide Notification No. 21/1/2015/T(B) dated 15.06.2015*

COMPOSITION OF THE STANDING COMMITTEE ON AGRICULTURE (2015-16)
Shri Hukm Deo Narayan Yadav - Chairperson

MEMBERS

LOK SABHA

2. Prof. Ravindra Vishwanath Gaikwad
3. Shri Sanganna Karadi
4. Shri Nalin Kumar Kateel
- *5. Smt. Raksha Nikhil Khadse
6. Md. Badaruddoza Khan
7. Shri C. Mahendran
8. Dr. Tapas Mandal
9. Shri Janardan Mishra
10. Shri Ajay Nishad
- \$11. VACANT
12. Shri Nityanand Rai
13. Shri Mukesh Rajput
14. Shri Konakalla Narayana Rao
15. Shri C.L. Ruala
16. Shri Arjun Charan Sethi
17. Shri Satyapal Singh (Sambhal)
18. Shri Virendra Singh
19. Shri Dharmendra Yadav
20. Shri Jai Prakash Narayan Yadav
21. Shri B. S. Yeddyurappa

RAJYA SABHA

- ^22. VACANT
23. Shrimati Renuka Chowdhury
- #24. Sardar Sukhdev Singh Dhindsa
25. Shri Janardan Dwivedi
- @26. Shri Meghraj Jain
27. Shri Vinay Katiyar
28. Shri Mohd. Ali Khan
29. Shri Ram Nath Thakur
30. Shri Shankarbhai N. Vegad
31. Shri Darshan Singh Yadav

*Smt. Raksha Nikhil Khadse, MP Lok Sabha, nominated to the Committee w.e.f. 13.04.2016 vice Prof. Richard Hay who ceased to be the Member of the Committee w.e.f. 13.04.2016.

\$ Vacant due to sad demise of Shri Dalpat Singh Paraste w.e.f. 01.06.2016

^ Vacant due to retirement of Shri A.W. Rabi Bernard from the Membership of Rajya Sabha w.e.f. 29.06.2016 vide CB-I Note dated 28.06.2016

Sardar Sukhdev Singh Dhindsa, MP Rajya Sabha, nominated to the Committee w.e.f. 23.05.2016 vide Lok Sabha Bulletin- Part II, No.3581 dated 23.05.2016.

@ Shri Meghraj Jain, MP Rajya Sabha, nominated to the Committee w.e.f. 28.07.2016 vide Rajya Sabha Bulletin- Part II, dated 28.07.2016.

Shri Rajpal Singh Saini from the Membership of Rajya Sabha w.e.f. 04.07.2016 vide CB-I Note dated 28.06.2016

SECRETARIAT

- | | | | |
|----|----------------------|---|---------------------|
| 1. | Shri U.B.S. Negi | - | Joint Secretary |
| 2. | Shri Arun K. Kaushik | - | Director |
| 3. | Smt. Juby Amar | - | Additional Director |
| 4. | Shri Sumesh Kumar | - | Under Secretary |

INTRODUCTION

I, the Chairperson, Standing Committee on Agriculture (2015-2016) having been authorized by the Committee to submit the Report on their behalf, present this Twenty Ninth Report (Sixteenth Lok Sabha) on the subject 'Impact of Chemical Fertilizers and Pesticides on Agriculture and Allied Sectors in the Country' pertaining to the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education).

2. The Standing Committee on Agriculture (2014-15) had selected this subject for examination and report. The Committee took evidence of the representatives of Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education and Department of Agriculture, Cooperation & Farmers Welfare), Ministry of Chemicals and Petrochemicals (Department of Fertilizers and Department of Chemicals and Petrochemicals) and Ministry of Health & Family Welfare (Department of Health Research) on the subject at their Sitting held on 10.12.2014, 16.12.2014, 05.01.2015 and 26.08.2015 respectively. The Standing Committee on Agriculture (2015-16) has again selected the subject for examination.

3. The Report was considered and adopted by the Committee at their Sitting held on 08.08.2016.

4. For facility of reference, the observations/recommendations of the Committee have been printed in bold at Part-II of the Report.

5. The Committee wish to express their thanks representatives of Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education and Department of Agriculture, Cooperation & Farmers Welfare), Ministry of Chemicals and Petrochemicals (Department of Fertilizers and Department of Chemicals and Petrochemicals) and Ministry of Health & Family Welfare (Department of Health Research) for furnishing requisite information to the Committee in connection with examination of the subject.

6. The Committee would also like to place on record their appreciation for the invaluable assistance rendered to them by the officials of the Lok Sabha Secretariat attached to the Committee.

NEW DELHI;
09 August, 2016
18 Shravana, 1938 (Saka)

HUKM DEO NARAYAN YADAV
Chairperson,
Standing Committee on Agriculture

(v)

Chapter-I

INTRODUCTION

1.1 Ever since invention, agriculture has been the mainstay of human civilization. Domestication of wild plants after onset of agriculture, led to surplus production of food grains which in turn supported more number of people in society. Innovation of new ways for food production in agriculture was revolutionary, as it allowed less number of people to be engaged for food production. In this way, society could deploy more persons to other activities which led to progress in the field of art, craft, science etc. Therefore, it has always been endeavor of every society of world to devise better varieties, process and ways to improve production, productivity and quality of agricultural produce so that pace of growth in agriculture may be kept ahead of population growth. Use of chemical fertilizers and pesticides was also seen as a revolution in the field of agriculture by which we were able to enhance agricultural productivity and food grains production across the world to the level do satisfying need of ever increasing population.

1.2 Our country is bestowed with diverse Agro-climatic resources which have massive potential for rich harvest of agricultural produce. However, at the time of independence, we were facing acute shortage of cereals and other agricultural products due to legacy of bad agricultural policies of British Government. In the backdrop of the food crisis that gripped India in the 1960s, the Government of India initiated the 'Green Revolution' program. This was an attempt to become self-sufficient in production of food grains. Traditional farming methods gave way to farming with high-yield seeds, fertilizers, and pesticides. The Green Revolution nearly quadrupled the production of rice and wheat, transforming India's fertile areas into 'granaries'. India has achieved a remarkable growth in agriculture, increasing food grain production from 83 mt in 1960-61 to about 252.7 mt (fourth estimate) in 2014-15. Now, our country is not only self sufficient in production of food grain to meet food requirement of the country but agriculture is also contributing towards foreign earning.

1.3 However, this stupendous growth in agriculture was not without many of unanticipated consequences. A few decades down the road, it was evident that the benefits of the Green Revolution are associated with unanticipated harmful effects of chemicals used as Fertilizers and Pesticides. Excessive use of fertiliser and associated chemical pesticides led to degradation and erosion of soil fertility, loss of bio-diversity due to monocropping, build up of toxic nutrient in soil, loss of micronutrients and loss of useful microorganism among other associated desirable and undesirable effects. Now, when our country is

planning and implementing strategy for initiating a new phase of green revolution, it is pertinent to examine pro and cons of earlier strategy based on use of chemical fertilizer and pesticides in order to incorporate suitable changes to save our precious natural resources without jeopardising agricultural growth.

Green Revolution Impact on Agricultural Growth in India

1.4 Strategy of Green Revolution was based upon *seed-fertilizer-irrigation* wherein, high yielding varieties of seeds were used for enhancing agricultural production and productivity with generous application of chemical fertilizers and irrigation. In the words of Vandana Shiva assumption of Green Revolution was based on the notion that nutrient loss and nutrient deficit can be made up by the use of non renewable inputs of phosphorous potash and nitrates as chemical fertilizers. The nutrient cycle, in which nutrients are produced by the soil as organic matter is thus replaced by linear non-renewable flow of phosphorous and potash derived from geological deposits, and nitrogen derived from petroleum.

1.5 Strategy of Green Revolution adopted in our country since 1960s has paid rich dividend as farmers of our country were able to enhance food production of the country not just to satisfy our needs but for earning valuable foreign exchange as well. India has achieved a remarkable growth in agriculture, increasing food grain production from 83 mt in 1960-61 to about 252.7 mt (fourth estimate) in 2014-15. Fertilizer consumption likewise has been showing a continuous upward trend, with consumption from less than 1 million tons of total nutrients in the mid sixties to almost 25.6 million tons in 2014-15. The Department of Agricultural Research and Education in documents submitted to the Committee have stated that fertilizers have played a prominent role in increasing foodgrain production of the country. About 50 percent increase in agricultural production in the post Green Revolution era is attributed to the use of fertilizers. The Ministry have further added that fertilizers are going to be crucial input in future as well, given the increasing food demands of growing population and insufficient availability of alternative nutrient sources. The country will require about 300 MT of food grains by 2025 to feed its teeming millions. This would necessitate use of about 45 MT of nutrients. While about 6-8 MT of nutrients could be supplied through existing organic sources, the rest has to come from chemical fertilizers. Therefore, the fertilizer industry has to keep pace with the growth of population and increasing food demands in the country.

1.6 While analysing impact of use of fertilizers on agricultural production in the country, it is important to analyse another factor such as decadal rate of agricultural growth *vis-a-vis* growth in net sown area so that exact increase of food grain production that can be attributed to the use of fertilizers be arrived. When asked to submit State-wise details regarding decadal growth rate of agriculture (food grain production) since 1960-61, the Department of Agricultural Research and Education submitted that decadal growth rate of agriculture (food grain production) *vis-a-vis* growth in Net Area sown in the country since 1960-61 are as follows:-

State-wise decadal growth rate in food grain production (000' tonnes) from 1960 onwards

State	1960-1970	1971-1980	1981-1990	1991-2000	2001-2012
Andhra Pradesh	-0.53	3.78	1.93	2.26	4.61
Assam	2.75	1.37	2.17	1.59	1.99
Bihar	12.27	0.39	5.58	2.14	0.95
Chhattisgarh	Na	Na	Na	Na	3.00
Goa	Na	0.45	47.73	2.55	-2.52
Gujarat	14.66	17.24	-10.89	-1.77	6.26
Haryana	14.59	4.96	4.54	3.82	3.39
Himachal Pradesh	5.17	1.32	3.18	-0.35	-0.42
Jammu & Kashmir	13.48	3.13	0.73	-1.55	1.22
Jharkhand	Na	Na	Na	Na	3.76
Karnataka	9.94	2.03	3.83	2.27	5.76
Kerala	4.30	-0.66	-2.56	-5.71	-2.26
Madhya Pradesh	11.08	-0.51	3.34	-2.09	2.99
Maharashtra	-1.44	11.07	3.31	-0.56	2.74
Manipur	-10.95	4.12	0.74	1.82	3.91
Meghalaya	Na	3.15	-0.94	4.76	1.02
Mizoram	Na	-7.71	32.97	2.30	-9.98
Nagaland	1.35	-1.92	34.21	2.91	3.72
Orissa	4.78	1.46	5.28	-4.67	2.40
Punjab	14.49	6.01	3.88	2.54	1.64
Rajasthan	11.50	1.32	2.26	2.74	4.80
Sikkim	Na	Na	9.02	-1.01	1.29
Tamil Nadu	4.62	-0.10	3.35	-0.07	5.09
Tripura	6.04	4.75	3.40	0.88	2.39
Uttar Pradesh	11.02	3.14	4.11	2.01	1.74

Uttarakhand	Na	Na	Na	Na	1.15
West Bengal	9.56	1.10	7.37	1.47	-0.39
All India	8.37	2.78	3.49	1.44	2.61

Source: Directorate of Economics and Statistics

Decadal Growth Rate of Net Sown Area in the Country

1.7 Net Sown Area is another important factor which affects agricultural growth rate in the country. When asked to submit State-wise details regarding decadal growth rate of Net Area Sown in the country since 1960-61, the Department submitted that decadal growth rate in Net Area Sown in the country since 1960-61 are as follows:-

State-wise decadal growth rate in the net area sown (area in 000'hectares) from 1960 onwards

State	1960-1970	1971-1980	1981-1990	1991-2000	2001-2012
Andhra Pradesh	0.26	-0.78	-0.26	0.19	0.95
Assam	0.08	1.46	0.13	0.02	0.26
Bihar	0.06	-0.23	-0.01	0.03	-0.67
Chhattisgarh	Na	Na	Na	Na	-0.24
Goa	Na	Na	0.62	0.61	-0.70
Gujarat	0.21	0.07	-0.27	0.12	0.80
Haryana	0.91	0.21	-0.28	0.26	0.06
Himachal Pradesh	9.79	0.32	0.12	-0.51	-0.22
Jammu & Kashmir	0.19	0.61	-0.02	0.12	-0.32
Jharkhand	Na	Na	Na	Na	-2.61
Karnataka	-0.13	-0.12	0.43	-0.50	0.00
Kerala	1.28	-0.04	0.34	-0.07	-0.60
Madhya Pradesh	1.48	0.07	0.30	0.00	0.18
Maharashtra	0.09	0.95	-0.20	-0.19	-0.12
Manipur	1.12	-1.33	0.00	0.00	7.52
Meghalaya	Na	1.96	0.64	2.54	1.14
Mizoram	Na	Na	0.00	6.13	1.53
Nagaland	3.49	5.61	1.56	4.92	0.95
Orissa	0.34	0.37	0.42	-0.81	-2.40

Punjab	-13.83	0.34	0.02	0.19	-0.28
Rajasthan	0.60	-0.14	-0.16	-0.26	0.77
Sikkim	Na	10.63	2.48	0.00	-1.48
Tamil Nadu	1.37	-0.76	0.35	-0.87	-0.22
Tripura	0.99	-0.21	1.30	0.66	-1.08
Uttarakhand	Na	Na	Na	Na	-0.77
Uttar Pradesh	0.09	0.03	0.00	-0.07	-0.13
West Bengal	0.21	-0.44	-0.41	0.18	-0.57
All India	0.42	0.22	0.08	-0.12	0.21

Source: Directorate of Economics and Statistics

Availability of Agricultural Land in the Country

1.8 Our Country is supporting 16.7% of World Population on only 2.4% of total land area of the World, So it is imperative that we utilise all available land for production of agriculture so that food security of the Country is ensured. When asked to furnish details of net available area in the Country, the Department submitted that net cultivable area in the country under agricultural use is 140 Million hectare. State-wise details are as follows:

State/Union Territory	Current fallows	Net area Sown	Cultivated land
Andhra Pradesh	2337	11117	13454
Arunachal Pradesh	38	216	254
Assam	81	2811	2891
Bihar	767	5402	6169
Chhattisgarh	257	4671	4928
Goa	12	132	144
Gujarat	379	10302	10681
Haryana	103	3513	3616
Himachal Pradesh	57	543	601
Jammu & Kashmir	113	745	858
Jharkhand	1440	1406	2846
Karnataka	1822	9793	11615

Kerala	77	2048	2125
Madhya Pradesh	375	15352	15727
Maharashtra *	1418	17344	18762
Manipur *	0	309	309
Meghalaya	60	285	346
Mizoram	50	116	166
Nagaland	50	380	430
Odisha	949	4386	5335
Punjab	58	4150	4208
Rajasthan	1869	17479	19348
Sikkim *	5	77	82
Tamil nadu	1308	4544	5852
Tripura	2	256	258
Uttarakhand	51	706	757
Uttar Pradesh	1201	16564	17765
West Bengal	379	5205	5584
Andman & Nicobar Island	3	15	17
Chandigarh	0	1	1
Dadar & Nagar Haveli	2	20	22
Daman & Diu	0	3	3
Delhi	12	22	34
Lakshadweep		2	2
Puducherry	5	16	21
All India	15282	139932	155214

1.9 On being asked about conversion of culturable land to Agricultural land in the Country since 1960-61, the Department stated as under:

"As per National Wastelands Change Analysis (Wasteland Atlas of India 2011: Change Analysis Based on Temporal Satellite Data of 2005-06 and 2008-09), the decrease in wastelands of 3.2 million hectares was observed between 2005-06 and 2008-09, spreading over 112057 locations (polygons), while simultaneously an increase in wastelands of 2.7 million hectares in 42886 locations was observed. Thus, the net result was decrease in wasteland area to the tune of 0.5 million hectares in 2008 - 09 as compared to 2005 - 2006, when aggregated for the entire country and wasteland classes. State-wise details are as follows:

State/UT wise total area under wastelands (square km.) during 2008-09 vis-à-vis 2005-06 and change in wasteland.

S. No.	State/U.T.	Total Wasteland		Change in Wasteland
		2005-06	2008-09	
	Andhra Pradesh	38788.22	37296.62	-1491.60
	Arunachal Pradesh	5743.83	14895.24	9151.41
	Assam	8778.02	8453.86	-324.15
	Bihar	6841.09	9601.01	2759.92
	Chhattisgarh	11817.82	11482.18	-335.64
	Delhi	83.34	90.21	6.87
	Goa	496.27	489.08	-7.18
	Gujarat	21350.38	20108.06	-1242.32
	Haryana	2347.05	2145.98	-201.07
	Himachal Pradesh	22470.05	22347.88	-122.17
	J & K	73754.38	75435.77	1681.39
	Jharkhand	11670.14	11017.38	-652.76
	Karnataka	14438.12	13030.62	-1407.50
	Kerala	2458.69	2445.62	-13.07
	Madhya Pradesh	40042.98	40113.27	70.29
	Maharashtra	38262.81	37830.82	-431.99
	Manipur	7027.47	5648.53	-1378.94
	Meghalaya	3865.76	4127.43	261.67
	Mizoram	6021.14	4958.64	-1062.50
	Nagaland	4815.18	5266.72	451.55
	Orissa	16648.27	16425.76	-222.51
	Punjab	1019.50	936.83	-82.67
	Rajasthan	93689.47	84929.10	-8760.37
	Sikkim	3280.88	3273.15	-7.73
	Tamil Nadu	9125.56	8721.79	-403.77
	Tripura	1315.17	964.64	-350.53
	Uttarakhand	12790.06	12859.53	69.47
	Uttar Pradesh	10988.59	9881.24	-1107.35
	West Bengal	1994.41	1929.20	-65.21
	Union Territory	337.30	315.00	-22.30
	Total	472261.94	467021.16	-5240.78

Long Term Impact of the strategies adopted for enhancing productivity during the Green Revolution in the Country

1.10 On the query of the Committee regarding assessment done about the long term impact of the strategies adopted for enhancing productivity during the Green Revolution in the Country, the Department submitted as under:

"The adoption of new agricultural technologies has resulted into Green Revolution that helped in achieving of self-sufficiency in staple foodgrains that is rice and wheat. A study on the issues related to growth in agricultural productivity was conducted at the National Institute of Agricultural Economics and Policy Research (NIAP), a unit of the Indian Council of Agricultural Research, New Delhi. The concept of 'Total Factor Productivity' (TFP) which is an appropriate tool to examine and understand the growth in productivity and to separate out effects of inputs and other factors from output growth or in other words the contribution of technological change to output growth. Using data on 'cost of cultivation of principal crops' for the period 1975-2005 this study examined productivity performance of Indian agriculture. There is a considerable variation in productivity performance, measured by the growth in TFP across crops. Wheat benefitted most from the technological change-- TFP grew close to 2% per annum. Rice lags behind wheat. Maize achieved TFP growth of about 0.67%. More than half of the total growth in output of wheat and around one-fourth in other cereals was due to TFP."

"The technology led-output growth has helped in reducing the real cost of production in the range of 1.0-2.3% per annum during the study period in case of cereals. The largest decline in the real cost per unit of output was in case of wheat. Returns to investment on agricultural research have been found to be a highly paying proposition. The overall internal rates of return to public agricultural research investment during 1975 to 2005 was estimated 29% for rice, 38% for wheat , 28% for maize, 39% for jowar, 31% for bajra, 34% for gram, 57% for arhar, 18% for groundnut, 20% for rapeseed-mustard, and 39% for cotton. The share of TFP growth in output has been found to vary across crops, ranging from 10.1% for rapeseed & mustard to 58.9% for wheat. The share of research in TFP growth has been estimated as 55.7% for rice, 40.1% for wheat, 79.2% for maize, 27.8% for jowar, 74.8% for bajra, 42.2% for gram, 36.0% for groundnut, 88.6% for rapeseed and mustard and 26.4% for cotton. Based on these estimates the study has found that about one-fourth growth in output of wheat and cotton, one-fifth in the case of bajra, and around 13% in paddy and maize have been due to investments in agricultural research. In most of the other crops, about one-tenth of output growth has been due to public sector research. These estimates have been used to provide an idea about the contribution of agricultural research to incremental out in a given

year. During 1975-76 to 2005-06, annual output of paddy has increased by 2.32%, of which 0.32 percentage point growth has been due to agricultural research; in terms of quantity, it comes out to be 0.4228 million metric tonnes per annum. Valued even at the minimum support price, this incremental output is worth Rupees 241 crores. Similarly, the contribution of research to wheat crop during 2005-06 has been estimated as 0.5896 million tonnes, valued at Rupees 636.8 crore. Cotton crop ranks second after wheat in terms of contribution of research valued at Rupees 562 crore. The contribution of research to TFP growth for the entire crop sector has been found as ` 3748 crore for the year 2005-06."

"An important contribution of output growth achieved through agriculture research is the reduction in import dependency in meeting the food requirement of the country and improving the food self-sufficiency of the nation. It has been estimated that without the contribution of research, wheat production in the country in the year 2005-06 would have been lower by 10.4 Mt and rice production would have been lower by 6.3 Mt. The contribution of research in enhanced production of maize and bajra has been estimated as 1.09 Mt and 0.64 Mt, respectively. Cumulative effect of agricultural research on output of gram has been estimated as 80 thousand tonnes. In oilseeds, groundnut production would have been lower by 80 thousand tonnes and rapeseed & mustard production would have been turns 5.2 lakh tonnes lower without contribution of research. During the year 2005-06, domestic demand for all the commodities, was much higher than what would have been the production in the country without contribution of research and India would have been far away from self-sufficiency status. Without the contribution of research, self-sufficiency in wheat would have declined to 83.4%. This implies that India would have been forced to import 9.8 Mt of wheat in the absence of research contribution. Similarly, without research contribution, India would have been forced to import 1.77 million tonnes of rice. Contribution of research in attainment of self-sufficiency in gram and groundnut has been limited."

"The agricultural research carried out during the past three decades has improved the self-sufficiency status in wheat by 15% and in rice by 7%. Growth in food production induced by research in India has reduced the import dependency of the country and has added to export, which amounts to 17 Mt of cereals – in value terms this comes to more than four times the annual investment in agricultural research. It has also reduced pressure on the globally-traded food commodities. In the absence of contribution of research in India, the global supply of rice and wheat (quantity available for export) would have reduced by about 12%. This could result in a

sharp increase in global grain prices causing adverse effect on food security of a large number of low income food-deficit countries, including India. The above findings highlight for maintaining for smooth growth in allocation of research resources."

Chapter-II

Improper Fertilizer Use and Decline in Crop Productivity

2.1 Plant requires nutrient for its growth. These Nutrient can be classified into macronutrient such as Nitrogen, Phosphorous and Potassium, secondary macronutrients such as calcium (Ca), magnesium (Mg), and sulphur (S) and micronutrients such as copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), zinc (Zn), boron (B), and of occasional significance there are silicon (Si), cobalt (Co), and vanadium (V) plus rare mineral catalyts. Naturally, Plant derive these elements from soil. However, natural process has its own limitations and rate of crop yeild is quite less. Externally, plant can derive these nutrients from fertilizers. Fertilizers enhance the growth of plants. This goal is met in two ways, the traditional one being additives that provide nutrients. The second mode by which some fertilizers act is to enhance the effectiveness of the soil by modifying its water retention and aeration.

2.2 Depending upon numbers of nutrients, fertilizers can be classified into Straight Fertilizers or Multi-component or Compound Fertilizers. One-component (straight) fertilizers contains one nutrient as a major. They may also comprise accompanying ions, respectively microelements. They are divided into nitrogen, phosphoric acid, potassium, calcium and magnesium fertilizers. On the other hand, multi-component (compound) fertilizers contains at least two or more major nutrients, may include accompanying ions and microelements.. According to the nutrient content they are divided into fertilizers – double ones containing 2 major nutrients (NP, NK, PK), triple (full), fertilizers with micronutrients and special group consists of fertilizers containing sulphur.

2.3 Use of fertilizer in agriculture requires a scientific approach and its application should be based on scientific testing of soil. Only specific fertilizer should be used in field to augment missing or deficient nutrient in soil. However, use of fertilizers in our country was hardly scientific and done without knowing soil requirement based on scientific soil test. Further, there was indiscriminate use of Urea due to subsidy policy of the Government. Over reliance on Urea and improper nutrient management has led to multi-nutrient deficiencies in Indian soils. The Department of Agricultural research and Education in their background note submitted to the Committee stated that in the early sixties, when fertilizer responsive varieties were introduced in India, optimum yields could be obtained with the application of nitrogenous fertilizers alone. However, the bumper harvests soon depleted other nutrients and their deficiencies started showing up. With nutrient application / additions never keeping pace with their removals by crops, the fertility status of Indian soils has been declining fast under intensive agriculture and are now showing signs

of fatigue, especially in the Indo-Gangetic plain. The partial factor productivity has gone down, necessitating additional inputs to obtain similar crop yields. Declining soil fertility is often cited as one of the reasons for stagnating or declining yields. The inadequate and imbalanced nutrient use coupled with neglect of organic manures has caused multi-nutrient deficiencies in many areas with time. The imbalanced fertilizer use in terms of NPK is evidenced by their wider consumption ratios of 31.4:8.0:1 and 27.7:6.1:1 against a desirable one of 4:2:1 in agriculturally important states of Punjab and Haryana, respectively, during 2014-15. Further, out of total 525 districts in the country, about 292 districts account for 85 % of the total fertilizer consumption. Today, the nutrient deficiencies at the country level are of the order of 89, 80, 50, 41, 49, 33, 13, 12, 5 and 3 % for nitrogen, phosphorus, potassium, sulphur, zinc, boron, molybdenum, iron, manganese and copper, respectively. The continuous use of high analysis chemical fertilizers (devoid of sulphur impurities) has made sulphur a limiting nutrient in many soils of the country. The deficiencies are becoming more critical for sulphur, zinc and boron. The limiting nutrients do not allow the full expression of other nutrients, thereby, lowering the fertilizer responses and crop productivity. The Indian agriculture, presently, is operating with a negative balance of plant nutrients in the soils.

Fertilizer Use and Environmental Concerns:

2.4 Suitable use of fertilizers based upon soil test would have certainly helped Indian agriculture to harvest bumper crops without associated negative effects. However, absence of soil test facility and efforts to educate the farmers, indiscriminate use of Nitrogen fertilizers have led to multiple problems affecting soil health and overall environment. The Department of Agricultural Research and Education in their background note submitted to the Committee the following negative effects of improper use of fertilizers:-

i. Human and animal health disorders:

2.5 Inadequate use of micronutrient fertilizers is aggravating trace element deficiencies in soils in many areas. The crops grown on these soils are, generally, deficient in micro nutrients. These deficiencies are linked with malnutrition and health disorders in humans and animals. The problem is more serious in young children, women of child bearing age and livestock. The Zn deficiency has become a big public health issue in India and is second in importance to Fe. It is assumed that around 25 % of Indian population is under risk of Zn deficiency related problems. The dietary intake of 0.2 - 0.3 mg Zn day⁻¹ is regarded as deficient. Its deficiency impairs the immune system and increases the incidence of infectious diseases such as diarrhea

and pneumonia. It also causes dwarfism, hypogonadism, anemia, geophagia, anorexia, skin lesions, rough and dry skin and loss of taste etc. A study in Haryana on 283 pregnant women has shown 65 % of them to be deficient in Zn based on low serum Zn concentration. The Zn deficiency related disorders like parakeratosis disease, associated with bone and joint disorders and thickening of skin, have been reported from Punjab and Haryana in animals feeding continuously on forages deficient in Zn. Likewise, wool-shedding syndrome in Corriedale sheep was observed at the Central Sheep Breeding Farm, Hissar due to Zn deficiency. Iron malnutrition is yet another problem in many parts of India, where poor people depend largely for their food on cereals containing low iron. Iron deficiency is associated with anemia, fatigue, nervousness, reduced appetite, lower weight gain, sore tongue and memory loss etc. Deficiencies have been reported in livestock of north-western Rajasthan and sheep and goats in West Bengal. Deficiencies of Cu, especially in sandy soils or soils having large content of organic matter, have also been reported to affect crop productivity and human health in India.

ii. Pollution of water resources:

2.6 A concern is being voiced, of late, regarding pollution of groundwater with nitrates due to more use of nitrogenous fertilizers. The problem is thought to be more in areas having light textured soils consuming higher doses of N followed by heavy irrigations. There are reports of nitrate pollution of ground water above the permissible levels (10 mg NO₃-N/L of water as safe limit in drinking waters) in agriculturally intensive areas of Punjab, Haryana, Gujarat, Maharashtra and Andhra Pradesh. Nonpoint source pollution of surface/river water due to flow of applied fertilizers and pesticides has also been reported. Split application synchronizing the demand of growing plant instead of one time heavy dose, placement of fertilizer, use of slow releasing N-fertilizers and nitrification inhibitors, inclusion of leguminous crops with deep and extensive root system in crop rotation with shallow rooted crops are some of the measures recommended to mitigate such problems.

iii. Greenhouse Gas Emission:

2.7 Nitrous oxide (N₂O) is a potent greenhouse gas which has been calculated to have 298 times the global warming potential of CO₂ over a 100 year period. Fertilizer is the largest source contributing around 77% of the total direct nitrous oxide emissions from agricultural soils. The most efficient management practices to reduce nitrous oxide emission are site specific integrated nutrient management, use of nitrification inhibitors, supplementation of nitrogenous fertilizers by biofertilizers, organic manures, demand

driven N application using Leaf Colour Chart (LCC), intercropping with legumes and use of deep embedded urea super granules. The mitigation strategies have twin benefits; first, raising N use efficiency thus reducing the consumption of nitrogenous fertilizers and secondly, lowering the nitrous oxide gas emission *vis-à-vis* global warming.

2.8 On being asked about research done on the impact of chemical fertilizers & pesticides on agricultural and allied sectors in the country, the Department submitted as under:

"The Indian Council of Agricultural Research under All India Coordinated Research Project on 'Long-Term Fertilizer Experiments' has assessed the impact of different combination of chemical fertilizers (NPK) on soil health and crop productivity in different soil types (fixed locations) under dominant cropping systems. The investigation over the last few decades indicated that inadequate and imbalanced use of nutrients and low use of organic manures may cause deterioration of soil health including multi-nutrient deficiencies affecting crop yields. Continuous use of nitrogenous fertilizer alone produced the highest decline in crop yields at almost all the locations showing deficiencies of other nutrients. Even in NPK fertilized system, the deficiency of micro and secondary nutrients surfaced after few years affecting crop productivity. Only integrated use of optimal dose of NPK and organic manure maintained soil health/quality with higher crop productivity."

2.9 However, when asked about study made by the Department/ICAR on the problem of eutrophication of water resources and ground water pollution due to excessive use of chemical fertilizers, the Department submitted as under:

" There is possibility of nitrate contamination in ground water above the permissible limit of 10 mg NO₃-N /L due to excessive use of nitrogenous fertilizers particularly in light textured soils that has consequence on human/animal health if used for drinking purpose. They have also stated that there is no report on excessive use a phosphatic fertilizers in the country leading to eutrophication of water resources."

2.10 When asked about action taken on the basis of these research/studies including the development of technologies to mitigate the adverse impact of chemical fertilizers and other chemical inputs on agricultural and allied sectors, particularly those affecting soil health, human health and productivity, the Department submitted as under:

"In order to reduce use of chemical fertilizers in the country, the Government under the component of soil health management of National Mission on Sustainable Agriculture (NMSA) is promoting soil test based balanced and integrated nutrient management through setting-up/strengthening of soil testing laboratories, establishment of bio-fertilizer and compost units, use of micronutrients, trainings and demonstrations on balanced use of fertilizers. Recently, a National Mission on Soil Health Card has been launched to provide soil test based fertilizer recommendations to all the farmers in the country. Besides, various schemes/programmes namely National Food Security Mission (NFSM), Rashtriya Krishi Vikas Yojana (RKVY), Mission for Integrated Development of Horticulture (MIDH), National Mission on Oilseeds & Oil Palm (NMOOP) National Programme on Organic Production (NPOP) of Agricultural & Processed Food Products Export Development Authority (APEDA) and Paramparagat Krishi Vikas Yojana are in operation to encourage greater use of organic inputs in agriculture."

2.11 When asked about the steps taken by the Government for 'sustaining higher crop productivity and better soil health through basic research and technological interventions' and 'enhancing soil productivity with minimum environmental degradation', the Department submitted as under:

"The ICAR through Indian Institute of Soil Science and AICRPs on Soil Test Crop Response (STCR), Micro- and Secondary Nutrients and Pollutant Elements (MSNP) and Plants, Long Term Fertilizer Experiments (LTFE) and Network Project on Soil Biodiversity-Biofertilizers are addressing all soil health and fertility related problems in the country. The Council through Indian Institute of Soil and Water Conservation (IISWC) has developed location specific bio-engineering measures to check soil erosion so as to prevent loss of top fertile soils. Similarly, Central Arid Zone Research Institute, Jodhpur has developed sand dune stabilization and shelter belt technology to check wind erosion. The Council through Central Soil Salinity Research Institute, Karnal and All India Coordinated Research Project (AICRP) on Salt Affected Soils has developed reclamation technology, sub-surface drainage, bio-drainage, salt tolerant varieties of different crops (namely, rice, wheat, and mustard) and agroforestry interventions to improve the productivity of saline, sodic and waterlogged soils in the country. Similarly, the Council has developed cost effective amelioration techniques for managing acid soils. Besides, resource conservation technologies have also been developed for improving soil health and crop productivity in the country. Recently, a Consortia Research Platform on Conservation Agriculture has also been initiated. For eco-friendly

agriculture and better soil health, ICAR has also made Biological Control and Biocontrol based Integrated Pest management practice, a flagship programme."

2.12 When asked about the role of Department of Agriculture and Cooperation on implementation of outcome of research and development on "Impact of Chemical Fertilizers and Pesticides on Agriculture and Allied Sectors in the country', the Department of Agriculture, Cooperation and Farmers Welfare submitted as under:

"Indian Institute of Soil Science (IISS), Bhopal under All India Coordinated Research Project (AICRP) on Long Term Fertiliser Experiments is monitoring the soil fertility in different soil types (fixed locations) under dominant cropping systems. The research trials over the last few decades indicate that integrated use of optimal dose of NPK and organic manure can maintain soil health and give higher sustainable yields. Details of the said Project are at **Annexure I.**" The Department of Agriculture, Cooperation and Farmers Welfare have sanctioned a Project to Indian Institute of Soil Science (IISS), Bhopal in year 2009-10 for preparation of Geo-referenced Soil Fertility maps in 19 major states (171 districts) to monitor soil fertility and generate site specific recommendations. periodic interface meetings are also held with Indian Council of Agricultural Research (ICAR) on issues of significance to agriculture such as development of Package of Practices for crops. Department of Agriculture and Cooperation is promoting soil test based balanced & judicious use of chemical fertilisers, bio-fertilisers and locally available organic manures, like Farm Yard Manure (FYM), vermi-compost and green manure to maintain soil health and its productivity. In order to promote balanced fertiliser application, Government is providing grant for setting up / strengthening of soil testing laboratories, trainings and demonstrations on balanced use of fertilisers and promotion of micro-nutrients across various Plan periods. At present, there are 1208 Soil Testing Laboratories with analysing capacity of 1.28 crore samples per annum. State-wise details are given at **Annexure II.**"

2.13 Elaborating further on the project, the representative of Department of Agriculture, Cooperation and Farmers Welfare stated as under:-

‘... हमने इसे मैप में बनाने की कोशिश की कि देश के किस भाग में कौन-से पोष्टिक तत्व की कमी है या अधिकता है। हरियाणा और पंजाब के कुछ भागों में हमने पाया कि वहाँ फासफोरस ज्यादा है। वहाँ हमने राज्य सरकार को सलाह दी कि डी.ए.पी. इस्तेमाल नहीं किया जाए। डी.ए.पी. की यह खासियत है कि वह ज़मीन में रह

जाता है। खरीफ और रबी फसल दोनों सीज़नों में लगाने की जरूरत नहीं है। यह फसल पर भी निर्भर करता है कि कौन-सा फसल लगा रहे हैं। पर हमेशा डी.ए.पी. की जरूरत नहीं है क्योंकि यह ज़मीन में रह जाता है। यूरिया तो एक-तिहाई भाप बनकर उड़ जाता है, एक-तिहाई पानी के साथ बह जाता है, सिर्फ एक-तिहाई ही पौधे के लिए बचता है। इस प्रकार की सलाह हम राज्य सरकारों को देते रहते हैं। जब वे उर्वरक मंगाने हैं, तो उर्वरक पहुंचाने का जिम्मा उन जिलों में, जो खासतौर से चिन्हित कर दिये गये हैं, जहाँ इनकी उपलब्धता अधिक मात्रा में है, वहाँ न भेजी जाए। कई राज्य सरकारें इसे अपनाती हैं, कई नहीं अपनाती हैं। इसके अलावा सेकेन्डी और माइक्रो न्यूट्रिएंट्स हैं, उस पर जितनी तवज़्ज़ो देनी चाहिए, उतनी शायद नहीं दी जाती है...'

2.14 On the query of the Committee regarding study made by the Department to assess the impact of indiscriminate use of chemical fertilizers and pesticides in the country, the Department of Agriculture, Cooperation and Farmers Welfare stated that no study has been conducted by the Department to assess the impact of indiscriminate use of chemical pesticides in the country.

2.15 On the query of the Committee regarding effect of unscientific use of chemical fertilizers and pesticides on human health, the Department of Health Research submitted that excessive/unscientific use of synthetic fertilizers has caused tremendous harm to the environment as well affects human population indirectly. Chemical fertilizers caused various deteriorating health hazards in animals as well. While elaborating upon effect of fertilizers on human health, the Department submitted that fertilizers contain heavy metals, including Silver, Nickel, Selenium, Thallium and Vanadium, Mercury, Lead, Cadmium and Uranium all directly linked to human health hazards. They can cause disturbances in the kidneys, lungs and liver and cause cancer. Synthetic fertilizers increase over six times the risk of dying of cancer types including brain cancer, lymphoma (non-Hodgkin's lymphoma, NHL), prostate cancer, leukemia and large intestine cancer. It can also cause methemoglobinemia. Details are given in the publications at Ann. 1-2

Chapter III

Pattern of Fertilizer use, Fertilizer Subsidy and Integrated Nutrient Management

3.1 Fertilizers are one of costliest input which has become a necessity in Indian agriculture sector. Keeping in view of low economic conditions of majority of small and marginal farmers, relatively lack of awareness about scientific fertilizer management and less penetration of availability of soil health card, it become pre-requisite that Government at Centre and State level take effective and adequate steps for scientific management of fertilizers in agriculture sector. This aspect become more important as our country is yet to achieve self sufficiency in production of different types of fertilizers and India has to depend upon import to meet the demands of fertilizers. Further, negative environmental impact of unscientific use of fertilizers also necessitate the need of scientific analysis and management of fertilizers. Therefore, economic as well as environmental aspects of fertilizer sector require us to analyse aspects associated with its production, import and use in agriculture sector in India.

Requirement, Availability and Import of Fertilizer

3.2 When asked to furnish details regarding total requirement, availability and import of fertilizer in the country, the Department submitted the following details:-

Total requirement (consumption), availability and import of fertilizer in the country

Year	Requirement/ Consumption (000 tonnes)	Availability/Production (000 tonnes)			Fertilizer Import (000 tonnes)			
		Nitrogen	Phosphorus	Total	N	P	K	Total import
2001-02	17360.00	10690	3835	14525	283	494	1697	2474
2002-03	16094.00	10508	3908	14416	135	228	1568	1932
2003-04	16631.00	10557	3627	14184	205	372	1553	2129
2004-05	18399.00	11305	4038	15343	413	307	2058	2779
2005-06	20340.30	11333	4203	15536	1390	1145	2764	5299
2006-07	21651.00	11525	4440	15965	2704	1373	2076	6153
2007-08	22570.00	10903	3714	14617	3708	1391	2668	7767
2008-09	24909.30	10900	3417	14317	3756	3067	3417	10239
2009-10	26486.40	11624	4374	15998	3488	2850	3190	9528
2010-11	28122.20	12179	4371	16550	4570	3739	3900	12208
2011-12	27790.00	12288	4364	16652	5578	4264	2558	12399
2012-13	25536.00	12237	3823	16060	4801	2797	1574	9172

Source: Fertilizer Statistics of India, various issues

Pattern of Fertilizer Consumption

3.3 When asked to submit State-wise details of pattern of fertilizer consumption in the country, the Department submitted the following information:-

S. No.	State/U.T.	Fertilizer consumption (NPK) in '000 tonnes		
		2011-12	2012-13	2013-14
1.	Andhra Pradesh	3342	2747	3119
2.	Karnataka	2335	1531	1641
3.	Kerala	303	277	322
4.	Tamil Nadu	1265	947	906
5.	Puducherry	22	16	16
6.	A&N Islands	1.0	1	1.0
7.	Gujarat	1733	1342	1565
8.	Madhya Pradesh	1892	1869	1901
9.	Chhattisgarh	596	602	568
10.	Maharashtra	3022	2473	2785
11.	Rajasthan	1356	1344	1218
12.	Goa	8.0	5.0	5.0
13.	Daman & Diu	.07	0.2	0.1
14.	D&N Haveli	1.0	1.0	1.0
15.	Haryana	1428	1350	1165
16.	Punjab	1918	1972	1713
17.	Uttar Pradesh	4258	4651	3842
18.	Uttarakhand	166	152	163
19.	Himachal Pradesh	51	48	50
20.	J & K	100	110	103
21.	Delhi	0.6	1.0	4.0
22.	Bihar	1380	1527	1261
23.	Jharkhand	171	198	103
24.	Odisha	515	490	487
25.	West Bengal	1617	1560	1227
26.	Assam	276	276	273
27.	Tripura	19	25	23
28.	Manipur	8	11	11
29.	Meghalaya	5	5	5
30.	Nagaland	1.4	2.0	2.0
31.	Arunachal Pr.	0.7	0.6	0
32.	Mizoram	1.0	2.0	3.0

Per hectare use of chemical fertilizers

3.4 When asked to furnish average use of chemical fertilizers (per hectare) state-wise in the country since 2009-10 , the Department furnished the following information:-

S. No.	State/U.T.	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
1	Andhra Pradesh	243.74	240.96	242.92	201.25	220.13	237.23
2	Karnataka	159.91	161.57	193.68	130.34	212.99	231.43
3	Kerala	99.25	107.12	113.20	106.93	153.65	176.15
4	Tamil Nadu	214.80	213.66	214.76	184.21	62.49	40.55
5	Puducherry	961.25	947.74	798.89	607.31	143.05	163.67
6	A&N Islands	41.76	47.89	50.56	40.00	637.65	284.69
7	Lakshadweep	0.00	0.00	0.00	-	28.15	29.09
	SZ TOTAL	196.08	198.47	211.13	166.33	--	-
8	Gujarat	162.36	158.34	132.44	106.51	164.05	174.68
9	Madhya Pradesh	77.58	84.72	84.03	80.82	119.63	132.79
10	Chhattisgarh	96.59	99.13	105.15	105.73	80.47	78.17
11	Maharashtra	135.57	149.10	137.30	113.04	86.45	92.07
12	Rajasthan	49.35	50.71	55.33	56.12	117.71	125.60
13	Goa	56.88	46.13	46.46	33.01	45.87	54.51
14	Daman & Diu	153.33	203.33	23.33	56.67	53.53	46.85
15	D&N Haveli	52.61	58.18	40.40	40.00	26.19	0.00
	WZ TOTAL	98.64	102.46	97.84	87.33	-	67.92
16	Haryana	213.46	208.70	220.07	211.76	85.93	92.61
17	Punjab	236.90	242.49	242.64	250.60	206.91	221.44
18	Uttar Pradesh	167.51	170.13	164.14	180.12	219.41	227.46
19	Uttarakhand	133.20	134.07	147.02	135.69	138.40	150.45
20	Himachal Pr.	56.58	57.73	54.71	50.34	164.13	159.95
21	J & K	97.53	106.38	86.19	94.39	51.32	53.96
22	Delhi	51.09	9.55	14.87	24.49	-	-
23	Chandigarh	-	-	-	-	32.96	82.25
	NZ TOTAL	181.66	183.87	181.67	191.11	-	-
24	Bihar	179.53	188.03	180.48	196.30	162.67	173.58
25	Jharkhand	119.62	101.04	119.84	119.26	169.88	178.65

26	Odisha	94.25	99.07	103.68	96.71	37.70	38.39
27	West Bengal	172.57	177.97	172.91	161.23	57.11	57.49
	EZ TOTAL	153.41	158.06	157.45	156.11	126.86	150.91
28	Assam	59.10	66.60	66.04	65.68	108.51	118.47
29	Tripura	53.18	45.54	50.24	69.13	88.77	125.08
30	Manipur	51.45	18.68	21.92	35.08	50.66	41.15
31	Meghalaya	10.95	14.88	14.04	14.26	44.20	61.84
32	Nagaland	1.93	3.14	3.04	4.44	47.25	0.00
33	Arunachal Pr.	2.97	2.99	2.42	2.00	5.18	6.34
34	Mizoram	44.47	46.28	12.27	15.17	0.00	0.00
35	Sikkim	0.00	0.00	0.00	0.00	-	-
	NE TOTAL	46.84	50.39	49.75	51.42	-	-
	ALL INDIA	140.15	142.52	142.05	131.36	67.92	82.63
		Source :- Based on Statistics at a Glance, Dte. Of Eco & Stat 2011- 12	Source :- Based on Statistics at a Glance, Dte. Of Eco & Stat 2011-12	Source:- Land Use Statistics at a Glance 2012-13	Source:- Land Use Statistics at a Glance 2012-13	Source:- State Governments	Source:- State Governments

State-wise ratio of consumption of chemical fertilizers (NPK)

3.5 When asked about State-wise ratio of consumption of chemical fertilizers (NPK) as against desirable ratio of 4:2:1 in the country, the Department submitted the following details:-

State wise fertilizer consumption ratio against the ratio 4:2:1 during 2014-15

Major States	NPK ratio
SOUTH ZONE	
Andhra Pradesh	4.9 : 2 : 1
Telanagana	10 : 3.3 : 1
Karnataka	3 : 1.5 : 1
Kerala	1.7 : 0.7 : 1

Tamil Nadu	3.2 : 1.2 : 1
Pondicherry	4.3 : 0.9 : 1
WEST ZONE	
Gujarat	10.6 : 3.1 : 1
Madhya Pr	15.5 : 8.4 : 1
Chattisgarh	6.6 : 3.1 : 1
Maharashtra	3 : 1.5 : 1
Rajasthan	62.7 : 21.8 : 1
Goa	2.9 : 1.3 : 1
NORTH ZONE	
Haryana	28 : 7 : 1
Punjab	36 : 8.7 : 1
Uttar Pradesh	16.9 : 4.9 : 1
Uttaranchal	18.7 : 3.5 : 1
Himachal Pradesh	3.7 : 0.9 : 1
J & K	4.3 : 2 : 1
EAST ZONE	
Bihar	9 : 2.1 : 1
Jharkhand	28.3 : 6 : 1
Orissa	5.3 : 2.1 : 1
W.B	2.4 : 1.2 : 1
Assam	1.9 : 0.6 : 1
Tripura	2.2 : 1.7 : 1
Manipur	5.7 : 1.1 : 1
Nagaland	2.8 : 1.6 : 1
ALL INDIA	6.7 : 2.4 : 1

3.6 On the above issue, the representative of Department of Agriculture, Cooperation and farmers Welfare stated as under:-

“यह हुआ है कि धीरे-धीरे यूरिया की खपत देश में बहुत ज्यादा हो गयी है। सामान्यतः ऐसा माना जाता है कि चार, दो और एक के अनुपात में नाइट्रोजन, फासफोरस और पोटैशियम का उपयोग होना चाहिए। पिछले दो सालों से, खासतौर से पंजाब में, मुझे एगजैक्ट याद नहीं आ रहा है, पर यह अनुपात चालीस, दस और एक हो गया है। स्थिति भयावह हो गयी है। आप सही फ़रमा रहे थे कि कई मर्तबा किसान को लगता है कि पोटैश के बदले भी यूरिया डाल दिया जाए और फासफोरस के बदले भी यूरिया डाल दिया जाए, हर

चीज के बदले यूरिया ही डाल दिया जाए क्योंकि यूरिया ही सबसे सस्ती है। डी.ए.पी. तो फिर भी महंगी है। उसे खरीदने से किसान कतराता है। जो पढ़ा-लिखा किसान है, वह तो ऐसा नहीं सोचता, पर कई मर्तबा किसान यह सोचता है कि डी.ए.पी. की जगह यूरिया डाल दिया जाए, तो भी काम चल जाएगा।“

Crop-Wise Use of Fertilizers

3.7 Perceptible variation has also been observed on use of fertilizer between different crops. On the query of the Committee regarding crop-wise fertilizer consumption in Country, the Department submitted as under:

Fertilizer use (kg/ha) by crop as per the input survey data of 2006-07

Crop	N	P	K	Total
Paddy	104.2	38.1	22.2	165.2
Wheat	122.7	46.6	7.3	176.7
Jowar	62.6	34.3	5.7	102.6
Bajra	45.2	9.9	1.1	56.2
Maize	85	32.1	4.8	121.9
Gram	44.4	41.7	6.1	92.1
Moong	49.8	37.5	2.8	90.1
Masur	87.2	69	22	178.2
R&Mustard	64.9	30.8	2.2	97.9
Sunflower	51.8	44.5	9.6	105.9
Groundnut	47.7	47	13.5	108.2
tot oilseeds	55.5	40.5	9.3	105.3
Sugarcane	151.8	57.5	30.1	239.3
Cotton	124.9	52.5	15.2	192.6
Potato	143	120.1	84.1	347.2
Total food grains	99.6	39.3	13.7	152.6
Total Pulses	48.1	43.2	6.3	97.6

Source: Agricultural Input Survey, 2006-07

3.8 When asked to submit details regarding use of various fertilizers viz. Urea, NPK (DAP, MOP) fortified fertilizers with Zn, Boron, bio-fertilizer, liquid fertilizer etc. by the farmers in the country, the Department furnished the following details:-

Per-hectare Consumption and Consumption of fertilizers (State-wise, product-wise) during 2014-15

S. No.	State/U.T.	Consumption (in '000 tonnes)				
		UREA	DAP	MOP	Complex	TOTAL
1	Andhra Pradesh	1674.72	282.43	283.25	1208.59	3448.99
2	Telangana	1366.93	189.11	108.59	801.39	2466.02
3	Karnataka	1532.60	515.04	362.89	1138.65	3549.18
4	Kerala	158.79	24.58	95.63	138.05	417.05
5	Tamil Nadu	990.82	242.48	293.77	493.68	2020.75
6	puducherry	14.66	1.34	2.59	5.78	24.37
7	A&N Islands	0.58	0.58	0.30	0.60	2.06
	SZ TOTAL	5739.10	1255.56	1147.02	3786.74	11928.42
9	Gujarat	2236.97	468.79	132.92	470.17	3308.85
10	Madhya Pradesh	2017.28	885.71	78.20	213.63	3194.82
11	Chhattisgarh	675.75	271.58	84.46	66.63	1098.42
12	Maharashtra	2590.33	584.04	451.91	1586.75	5213.03
13	Rajasthan	1830.54	551.55	10.09	58.84	2451.02
14	Goa	3.56	1.52	0.71	2.56	8.35
15	Daman & Diu	0.28	0.06	0.00	0.00	0.34
16	D&N Haveli	0.99	0.96	0.00	0.00	1.95
	WZ TOTAL	9355.70	2764.21	758.29	2398.58	15276.78
17	Haryana	1999.95	490.70	51.46	36.10	2578.21
18	Punjab	2673.50	658.70	55.10	28.10	3415.40
19	Uttar Pradesh	6080.66	1536.77	204.33	574.02	8395.78
20	Uttarakhand	279.66	25.53	1.78	38.50	345.47
21	Himachal Pradesh	69.59	0.00	9.66	23.00	102.25
22	J & K	115.93	63.71	24.53	2.02	206.19
23	Delhi	9.09	0.00	0.00	0.00	9.09
24	Chandigarh	0.00	0.00	0.00	0.00	0.00
	NZ TOTAL	11228.38	2775.41	346.86	701.74	15052.39
25	Bihar	1940.40	352.71	153.72	262.05	2708.88
26	Jharkhand	180.18	27.13	0.64	26.19	234.14
27	Odisha	505.99	152.83	91.92	239.23	989.97
28	West Bengal	1312.34	255.98	233.70	862.38	1802.02
	EZ TOTAL	3938.91	788.65	479.98	1389.85	5735.01
29	Assam	299.53	33.62	110.36	0.00	443.51
30	Tripura	16.75	2.30	6.26	0.00	25.31
31	Manipur	22.41	3.90	3.24	0.00	29.55
32	Meghalaya	0.28	0.04	0.02	0.00	0.34
33	Nagaland	1.71	1.22	0.58	0.60	4.11
34	Arunachal Pr.	0.97	0.15	0.25	0.00	1.37
35	Mizoram	6.23	0.50	0.49	0.00	7.22
	NE TOTAL	347.88	41.73	121.20	0.60	511.41
	ALL INDIA	30609.97	7625.56	2853.35	8277.51	48504.01
	Source: State Government					

3.9 On the query of the Committee regarding amount of fertilizers absorbed by the plants, the Department submitted as under:

"The efficiency of fertilizer nitrogen is only 30-40% in rice and 50-60% in other cereals, while the efficiency of fertilizer phosphorus is 15-20% in most crops. The efficiency of K is 60-80%, while that for S is 8-12%. As regards the micronutrients, the efficiency of most of them is below 5%."

3.10 On the above issue, the representative of Department of Agriculture, Cooperation and Farmers Welfare stated as under:-

“...एक और बात है, जिस पर से हमारा ध्यान नहीं हटना चाहिए। हम भूमि में से जो भी पौधा या फसल उगाकर उसमें से पौष्टिक तत्व निकालते हैं, कम से कम उतना ही पौष्टिक तत्व हमें वापस उसमें डालना है। उसे जैविक खाद के माध्यम से डालना है या रासायनिक खाद के माध्यम से डालना है, वह दूसरी बात है। मुख्य बात यह है कि पौष्टिक तत्व हमें वापस डालना है, नहीं तो भूमि उर्वरा शक्ति कम होती जाएगी। कई ऐसी फसलें हैं, जो भूमि से पौष्टिक तत्व खिंचते हैं, उसमें मेटल कंटेंट भी होता है और बाकी पौष्टिक तत्व भी होते हैं। सभी चीजें केवल खाद से नहीं आ पाती हैं। इसमें कुछ रासायनिक खाद डालना भी जरूरी होता है।...”

Integrated Nutrient Management

3.11 Integrated nutrient management (INM) encompassing conjunctive use of chemical fertilizers including secondary and micronutrients, organic manures, composts/vermicomposts, biofertilizers and green manures merits adoption on a large scale. The Long Term Fertilizer Experiments have indicated very clearly that the response to the fertilizers could be raised significantly with balanced application of fertilizer nutrients along with organic manures. The average response ratios (kg grain /kg nutrient) were 8.1, 10.1, 12.8 and 15.2, respectively under N, NP, NPK and NPK+FYM. The system enhances nutrient-use efficiency (which is low for majority of nutrients), maintains soil health and enhances crop yields and farmers' profitability. As informed by the Department, the Indian Council of Agricultural Research has made significant contributions towards promotion of INM in the country by running many All India Coordinated Projects throughout the country. The Council has so far generated GIS based soil fertility maps in respect of macro, secondary and micro nutrients for 172 districts. These geo-referenced maps can be useful in monitoring soil fertility, fertilizer recommendations for balanced nutrient application in various parts of the

country. A user-friendly software has been developed for use by the soil testing laboratories to have fertilizer recommendations online. The council has also generated integrated nutrient management packages for major cropping systems of the country and the information has been passed on to different states through Department of Agriculture and Cooperation of the Ministry of Agriculture. The technologies for the preparation of urban and rural composts (including vermicompost, Bio-enriched compost, phosphocompost), green manuring, and crop residue recycling etc. have been standardized and demonstrated successfully on various crops. Promising strains of N fixers (Rhizobium, Blue Green Algae, Azolla-Anabaena association, Azospirillum and Azotobacter etc.), Phosphate Solubilizing Bacteria and Mycorrhizae have been developed for the production of quality biofertilizers. Liquid Biofertilizer technology with high shelf life has also been developed. Resource conserving technologies like fertigation, zero tillage, bed planting, laser land leveling and leaf colour chart (LCC) techniques etc are being demonstrated to save costly fertilizers. The Council is giving special thrust on conservation agriculture practices to sustain good soil health minimizing green house gas emissions. The Council is organising workshops and training programmes to educate farmers on all these aspects.

In order to ensure judicious use of chemical fertilizer and maintaining good soil health in the country, the Government under the component of soil health management of NMSA is promoting soil test based balanced and integrated nutrient management through setting up/strengthening of soil testing laboratories, establishment of bio-fertilizer and compost units, use of micronutrients, trainings and demonstrations on balanced use of fertilizers etc. Recently, a National Mission on Soil Health Card has been launched to provide soil tested based fertilizer recommendation to all the farmers in the country."

3.12 When asked about the policy of the Government of India to achieve the objective as outlined in Integrated Nutrient Management, the Department submitted as under:-

"As soil test based application of fertilizers is essential to improve soil health and productivity, the Government is promoting Integrated Nutrient Management (INM) i.e. soil test based balanced and judicious use of chemical fertilizers, bio-fertilizers and locally available organic manures like Farm Yard Manure, compost, Vermi Compost and Green manure to maintain soil health and its productivity. The policy of Integrated Nutrient Management has been adopted from 10th Plan period with renaming Fertilizer Division to Integrated Nutrient Management Division."

3.13 On being asked about the efforts being made in the Country to achieve the objective as outlined in Integrated Nutrient Management System, the Department submitted as under:

"The ICAR through Indian Institute of Soil Science and AICRPs on Soil Test Crop Response (STCR), [Micro- and Secondary Nutrients and Pollutant Elements \(MSNP\) and Plants](#), Long Term Fertilizer Experiments (LTFE) and Network Project on Soil Biodiversity-Biofertilizers are addressing the objective as outlined in Integrated Nutrient Management System. Accordingly, the Government has taken up following efforts to achieve the objective as outlined in Integrated Nutrient Management System:-

- i) Government has taken up Management of Soil Health & Fertility under National Mission for Sustainable Agriculture to promote soil test based balanced and judicious use of fertilizers. The scheme provides assistance for setting up new static/mobile soil testing laboratories (STLs), strengthening of existing STLs, training of STL Staff/extension officers/farmers, field demonstrations on balanced use of fertilizers.
- ii) Under National Project on Organic Farming (NPOF) financial assistance is provided as credit linked back ended subsidy @ 33 per cent of total outlay restricted to Rs.60.00 lakh for setting up fruit/vegetable market waste/Agro-waste compost production units.
- iii) Soil Health Card Scheme has been taken up to provide soil health card to all farm holdings in the country at an interval of 3 years so as to enable the farmers to apply appropriate recommended dosages of nutrients for crop production and improving soil health and its fertility."

3.14 When asked about workshops and training programmes organized by ICAR Institutes on Integrated Nutrient Management in the Country during the last five years, the Department have submitted following details:-

- 27 nos. (For details please refer to **Annexure III**)
- Additionally 140 training programme on INM were conducted under AICRP-LTFE"

3.15 When asked about technologies developed by ICAR Institutes as alternative of fertilizers for achieving the objectives of INM by ICAR Institutes during the last five years, the Department submitted as under:-

The ICAR-Indian Institute of Soil Science alongwith its AICRPs located at various SAUs has developed following technologies to ensure soil test based balanced and integrated nutrient management throughout the country.

- Digitized soil fertility maps (Macro & micronutrients) for different states prepared.
- Developed ready reckoners for soil test based fertilizer recommendations.
- Launched soil test based on-line fertilizer recommendation system for different cropping systems.
- Documented integrated nutrient management packages for major cropping systems of the country to promote balanced fertilization.
- Developed biofertilizer technology for mass multiplication and adoption by the farmers.
- Standardized Vermi/enriched-composting technology including bio-enriched compost from various organic wastes.
- Identified fungi (*Aspergillus terreus/ flavus/ heteromorpha* and *Rhizomucor pusillus*) for rapid composting within 75 days of segregated municipal solid wastes.
- Developed liquid biofertilizer formulations and microbial consortia.
- In addition, split application and placement of fertilizers, use of slow releasing N-fertilizers and nitrification inhibitors, growing leguminous crops and use of Resource Conservation Technologies (RCTs) are also advocated."

3.16 On the query of the Committee regarding ICAR Institute for engaged in research on INM, the Department submitted as under:

"The ICAR through Indian Institute of Soil Science and AICRPs on Soil Test Crop Response (STCR), [Micro- and Secondary Nutrients and Pollutant Elements \(MSNP\) and Plants](#), Long Term Fertilizer Experiments (LTFE) and Network Project on Soil Biodiversity-Biofertilizers are addressing researchable issues related to INM in the country."

3.17 When asked about efforts made by the ICAR for preparation of inventory of good farming practices promoting minimum use of chemical fertilizers in the Country, the Department submitted as under:

"ICAR has documented integrated nutrient management packages (**Annexure IV**) for major cropping systems of the country to promote INM with less use of Chemical fertilizers in the country."

SOIL HEALTH CARD SCHEME

3.18 In order to cover all districts of the country, a new scheme 'Soil Health Card' has been approved for implementation during 12th Plan. Soil Health Card with information on macronutrients and micronutrients will be generated for all the 14 crore landholdings in a cycle of 3 years. Besides, it also provides an advisory on soil test based use of fertilisers and amendments. Uniform soil sampling procedure will be adopted by the State for rainfed and irrigated areas. The scheme will provide assistance to State Governments to issue soil health cards periodically every 3 years, to all farmers of the country, so as to ensure that farmers apply the required amount of nutrients to their crops. Soil Health Card data can always be cross-checked with the Geo-referenced points used for preparation of soil fertility maps. When asked about status of scheme of Soil Health Cards in the Country as on date, the Department submitted as under:

"Status of scheme of Soil Health Cards in the Country is given below:-

- i) During 2014-15 funds amounting to Rs. 23.56 crore released to States for preparatory activities for issue of soil health cards like training and awareness creation etc.
- ii) During 2015-16 against allocation of Rs. 96.46 crore, fund amounting to Rs. 72.34 crore have been released.
- iii) Weekly review on status of activities on soil sampling is being ascertained from States through video conferencing; so far 45.27 lakh soil samples have been collected by States against target of 90.57 lakh soil sample during 2015-16."

3.19 On being asked about the problems and constraints hindering the expeditious implementation of the Scheme, the Department of Agriculture Research and Education submitted as under:

"The major problems and constraints hindering the expeditious implementation of the Scheme are:-

- i) The states are yet to release their share of funds for implementation of the scheme.
- ii) Inadequate soil testing capacity and man power shortage in the soil testing laboratories under state government.
- iii) Arrangements for printing of soil health cards to be put in place by states."

3.20 When asked about views of the Department to improve/reorient the Scheme so that Soil health Cards are issued universally at the earliest, the Department submitted the following suggestions:-

- "i) States to mobilize all staff for collection of remaining samples immediately after harvest of standing Kharif crop.
- ii) States to make wide publicity for awareness of farmers and other stakeholders.
- iii) Necessary training for soil testing staff to be organized by states.
- iv) States to train all concerned staff in use of SHC software by DAC&FW and upload all relevant data.
- v) To introduce 2 shifts in Soil Testing Laboratories.
- vi) Outsourcing of various components of the scheme i.e. sample collection, sample testing and card printing."

3.21 On being asked about details of allocation and expenditure for the Soil Health Card Scheme during 12th Plan, the Department submitted as under:

"An amount of Rs. 568.54 crore have been allocated for the Soil Health Card Scheme during 12th Plan. So far following funds have been release:-

2014-15 – Rs.23.56 crore

2015-16 – Rs. 72.34 crore (against an allocation of Rs. 96.46 crore)"

Soil Testing Labs In Country

3.22 When asked to furnish State-Wise details about soil testing labs functional in the country as on date, the Department submitted as under:

"As on date 1244 soil testing labs are functioning under the State governments. State wise details are as follows:

Statement showing State-wise Number of Soil Testing Laboratories in the country, their Analyzing Capacity, and Utilization during 2013-14

Sl. No	Name of the State	No of Soil Testing Laboratories				Total			Annual Analyzing Capacity in '000	Sample Analyzed in'000'	Capacity Utilization (%)
		State Govt.		Fert. Industry		Static	Mobile	Total			
		Static	Mobile	Static	Mobile						
I	South Zone										
1	Andhra Pr.	55	5	27	1	82	6	88	413.00	345.785	83.73
2	Karnataka*	56	0	6	2	62	2	64	295.66	194.81	65.89
3	Kerala	14	11	1	0	15	11	26	218.00	134.68	61.78
4	Tamil Nadu	30	16	1	1	31	17	48	5796.72	4823.54	83.21

5	Puducherry*	2	0	0	0	2	0	2	4.00	4.41	110.25
	Total	157	32	35	4	192	36	228	6727.38	5503.23	81.80
II.	West Zone										
6	Gujarat	132	2	4	1	136	3	139	1412.00	1199.13	84.92
7	Madhya Pr.	50	7	2	4	52	11	63	378.00	346.52	91.67
8	Maharashtra*	123	23	8	4	131	27	158	2241.35	967.27	43.16
9	Rajasthan	34	22	1	2	35	24	59	536.00	402.69	75.13
10	Chhattisgarh	7	5	1	0	8	5	13	105.00	116.02	110.50
11	Goa	2	0	0	0	2	0	2	23.00	14.96	65.04
	Total	348	59	16	11	364	70	434	4695.35	3046.59	64.89
III	North Zone										
12	Haryana	35	3	2	0	37	3	40	365.00	247.89	67.92
13	Punjab*	54	12	2	3	56	15	71	631.50	282.11	44.67
14	Uttarakhand	13	3	0	0	13	3	16	106.54	95.23	89.38
15	Uttar Pradesh	255	18	5	3	260	21	281	4159.50	3404.58	81.85
16	Himachal Pr.	11	4	0	0	11	4	15	125	124.38	99.50
17	J&K *	8	5	0	0	8	5	13	52.00	43.61	83.87
18	Delhi	1	0	0	0	1	0	1	5.00	0.46	9.20
	Total	377	45	9	6	386	51	437	5444.54	4198.26	77.11
IV	East Zone										
19	Bihar	39	0	0	0	39	0	39	230.00	248.71	108.13
20	Jharkhand	8	0	0	0	8	0	8	40.00	10.67	26.68
21	Orissa	17	6	1	0	18	6	24	270.00	255.06	94.47
22	West Bengal	10	8	0	2	10	10	20	112.40	60.43	53.76
	Total	74	14	1	2	75	16	91	652.40	574.87	88.12
V	NE Zone					0	0	0			
23	Assam *	7	4	0	0	7	4	11	84.00	60.76	72.33
24	Tripura	2	4	0	0	2	4	6	35.00	17.54	50.11
25	Manipur	4	4	0	0	4	4	8	40.00	1.37	3.43
26	Meghalaya	3	3	0	0	3	3	6	30.00	27.65	92.17
27	Nagaland	3	0	0	0	3	0	3	45.00	14.30	31.78
28	Arunachal Pr.	5	3	0	0	5	3	8	9.00	7.86	87.33
29	Sikkim	4	2	0	0	4	2	6	37.00	39.87	107.76
30	Mizoram	3	3	0	0	3	3	6	27.00	25.00	92.59
	Total	31	23	0	0	31	23	54	307	194.35	63.31
	Grand Total	987	173	61	23	1048	196	1244	17826.67	13517.30	75.83

* Information not provided/ not provided correctly but taken previous years progress.

3.23 When asked about the policy of government to involve private sector/PSUs/NGOs for establishment of soil testing labs in the Country and implementation of soil health card scheme in the country, the Department submitted as under

"Under the guidelines of Soil Health Management scheme the state governments are free to encourage involvement of other agencies such as Private Companies associated with Agriculture Extension in some way such as Fertilizer Companies, Agriclincs, NGOs, Cooperative Societies and entrepreneurs (Agri-preneurs). The State Governments will need to announce clear guidelines involving these private sector agencies in the operation and management of these Soil Testing labs. State Governments are encouraged to announce innovative PPP Guidelines for involvement of Private sector for running of these Labs. The guidelines should, inter alia, clearly define all the terms and conditions including the soil testing charges to be charged from farmers and the MOU/ Agreement to be signed with these private agencies, clear cut monitorable targets. State Governments will monitor and review performance of these private sector labs periodically. Apart from above the states can outsource all components of Soil Health Card Scheme i.e. samples collection, sample testing and card printing."

3.24 On the query of the Committee regarding provision for training of farmers under Soil Health Card Scheme, the Department submitted as under:

"The soil health card scheme has provision for training of farmers @ Rs.24000.00 per training of 2 days in a batch 30 farmers. Since the funds have been recently released under the scheme, the progress is yet to be received from states."

3.25 When asked about under the soil health card scheme regarding grievance redressal system to address issues such as delay in availability of soil testing facilities, the Department stated as under:

"As such there is no redressal system under the scheme. However, any complaint can be made to the implementing agencies i.e. state departments of agriculture. So far no complaint has been received in DAC&FW."

3.26 When asked about status of soil fertility map, the Department of Agriculture, Cooperation and Farmers Welfare stated as under:

"Indian Institute of Soil Science (IISS), Bhopal has compiled soil test data of 500 districts on available macro nutrients (N,P&K) status from different locations in various states between years 1995 and 2008. Out of 500 districts, 465 districts (93%) were found deficient in available Nitrogen, 457 districts (91%) were found deficient in available Phosphorous and 259 districts (52%) were found deficient in available Potassium."

3.27 On the query of the Committee regarding availability of data on micro and macro nutrients in the soil in the country, the Department of Agriculture, Cooperation and Farmers Welfare stated as under:

"IISS, Bhopal has prepared Geo-referenced soil fertility maps in year 2013-14 for 171 districts indicating deficiency in available macro nutrients (N,P&K) as well as available micro-nutrients (Zinc, Iron, Copper and Manganese and Boron).

Organic Farming

3.28 Organic Farming based upon sound agronomic practices, crop rotation, use of farm land manure for bio-fertilizers and bio-pesticides for enhancing soil productivity and use of natural methods and bio-pesticides to control pests and weeds is an important way to avoid harmful impacts associated with chemical fertilizers and pesticides on agriculture and allied sectors in the country. Traditionally, agriculture in our country was largely organic. However, it was not able to produce enough food grains to satisfy ever increasing population of the country and there was gradual shift to use of chemical fertilizers and pesticides. Still, traditional agriculture based upon organic farming is still practice in some parts of country. Further, with growing awareness about benefits of organic farming and demands organic food products of aware consumers in India and abroad, some progressive farmers and institutions have started to promote organic farming in the country.

3.29 When asked about role of Department of Agriculture, Cooperation & Farmers Welfare and APEDA on certification/validation of the organic crops, the Department of Agriculture, Cooperation and Farmers Welfare submitted as under:

"National Programme on Organic Production (NPOP) notified in 2001 under Foreign Trade Development and Regulation (FTDR) Act (administered by Department of Commerce) defines the regulatory mechanism for export of organic produce. As a Secretariat to NPOP, the various activities of APEDA involved in the implementation of NPOP are:

- Updating the national standards for organic production.
- Evaluation of Certification bodies for accreditation.
- Accreditation of Certification Bodies.

- Surveillance of Certification Bodies to maintenance of uniform system of operations as per ISO 65.
- Bilateral negotiations with the importing countries for recognition of equivalence
- Data Management for Organic Products through web – based traceability system for enhancing the credibility of certification system has been developed.
- All other activities related to implementation of NPOP (conveying to National Steering Committee (NSC), National Accreditation Body (NAB) and Technical Committee (TC)."

NPOP has earned equivalence with European Union and Switzerland. USDA has accepted the conformity assessment system of NPOP. This means that any produce certified by Indian agencies can be exported to these countries without the requirement of recertification."

3.30 On the query of the Committee regarding mechanism to verify and validate the organic crops as well as its role in marketing and measures for marketing the same, the Department of Agriculture and Cooperation submitted as under:

"The modalities of operations under NPOP are as follows:

- i. The accredited Certification Bodies under NPOP carry out the inspections of the operations of all registered operators under them to verify the compliance to the requirements of the production standards under NPOP.
- ii. When all the standard requirements are met in the entire chain of operations by the operators (Production, Processing & trading) the products are certified as organic.
- iii. Certification Bodies provide scope certificates every year to the operators after verification for the Products that are produced as per NPOP standards.
- iv. For any sale of the certified product a Transaction Certificate (TC) is given to the operator. The TC ensures the buyer that the product is organic produced under NPOP.
- v. To maintain the traceability of the certified products flow, APEDA has introduced "TRACENET", a web based Traceability system. The scope and transaction certificates are issued electronically through TRACENET by the accredited Certification Bodies.
- vi. All certificates issued by the Certification Bodies on TRACENET bear a bar code for verifying the authenticity of the product certified."

Incentives to encourage Organic Farming

3.31 When asked about incentives being provided to the farmers to encourage organic farming the Country, the Department of Agriculture, Cooperation & Farmers Welfare submitted as under:

"The Government is providing financial assistance @ 25% of total financial outlay, subject to a ceiling of Rs.40 lakhs to individuals/private agencies for bio-fertilizer production units. 100% assistance is provided to State Govt. / Govt. agencies up to a maximum limit of Rs. 160 lakh per unit as Capital Investment subsidy for setting up bio-fertilizer units of up to 200 Tons Per Annum (TPA) production capacity. As on March 2014, 50 bio-fertilizer production units have been established under the scheme with production capacity of 12563 Tons Per Annum."

"Besides This, Government has launched the Paramparagat Krishi Vikas Yojana (PKVY) under NMSA which is being implemented by DAC, through which assistance is provided for Organic Farming. Under PKVY, it is proposed to develop 10,000 clusters with a cluster size of 50 acres so as to increase certified area by 5 lakh acre in next 3 years and to develop potential markets for organic products."

3.32 When asked to furnish details of coverage area and production of organic farming in the Country, the Department submitted as under:

"Certified area under Organic Farming, excluding wild harvest, is 7.23 lakh hectare during 2013-14 as reported by APEDA."

Certification of Organic Farming Produce

3.33 On the query of the Committee regarding agencies responsible for certification of organic farming produce in the Country and the details of certification done by these agencies during the last three years., the Department submitted as under:

"APEDA, Ministry of Commerce, Government of India is the agency which is authorized for the third party certification for the organic products for the Export."

Use of bio-fertilizer

3.34 A bio-fertilizer is a substance which contains living microorganisms which, when applied to seeds, plant surfaces, or soil, colonizes the rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrients to the host plant. Bio-fertilizers add nutrients

through the natural processes of nitrogen fixation, solubilizing phosphorus, and stimulating plant growth through the synthesis of growth-promoting substances. Bio-fertilizers such as Rhizobium, Azotobacter, Azospirillum and blue green algae (BGA) have been in use a long time. Bio-fertilizers can be expected to reduce the use of chemical fertilizers and pesticides. Bio-fertilizers provide eco-friendly organic agro-input and are more cost-effective than chemical fertilizers. they are extremely advantageous in enriching soil fertility and fulfilling plant nutrient requirements by supplying the organic nutrients through microorganism and their byproducts. Hence, bio-fertilizers do not contain any chemicals which are harmful to the living soil. On the query of the Committee regarding use of bio-fertilizer by the farmers in the country, the Department submitted the following details regarding use of bio-fertilizers (carrier and liquid based) in the country :-

Sl. No.	State	2014-15	
		Carrier based (MT)	Liquid (KL)
1	A & N Islands	0.0000	0.0000
2	Andhra Pradesh	2668.8000	274.8560
3	Daman & Diu	0.0000	0.0000
4	Karnataka	16462.6200	23.0561
5	Kerala	4916.9700	10.5096
6	Lakshadweep	0.0000	0.0000
7	Pondicherry	560.9500	1.4976
8	Tamil Nadu	15373.2900	11.3017
	Total	39982.6300	321.2210
1	Chhattisgarh	1024.680	9.620
2	Gujarat	3667.929	2800.500
3	Goa	802.520	0.000
4	Madhya Pradesh	2637.990	119.216
5	Maharashtra	14847.397	324.767
6	Rajasthan	599.898	0.000
7	D & N Haveli	0.000	0.000
	Total	23580.414	3254.103
1	Delhi	104.500	0.000
2	Chandigarh	0.000	0.000
3	Haryana	872.955	46.489
4	H.P.	0.768	33.070
5	J & Kashmir	0.000	0.000
6	Punjab	6305.453	74.278
7	Uttar Pradesh	4099.068	98.036
8	Uttarakhand	2129.952	208.034
	Total	13512.696	459.907
1	Bihar	64.90	0.00
2	Jharkhand	9.08	0.00
3	Odisha	1074.46	4.70
4	West Bengal	2061.83	14.63
	Total	3210.27	19.33
1	Arunachal Pradesh	59.000	0.000

2	Assam	88.000	0.000
3	Manipur	0.000	0.000
4	Meghalaya	0.000	0.000
5	Mizoram	3.600	0.000
6	Nagaland	7.450	0.000
7	Sikkim	12.400	0.000
8	Tripura	240.000	0.000
	Total	410.450	0.000
	Grand Total	80696.45595	4054.563711

Source: Compiled by NCOF (Data Provided by Production Units/State Government/ RCOFs

Policy for Promotion of Use of Bio-Fertilizers

3.35 When asked about provision of the Government incentive to enhance use of bio-fertilizers, liquid fertilizers, organic manures, etc. in the Country, the Department submitted the following details of assistance being provided to the farmers under Soil Health Management component of National Mission on Sustainable Agriculture:-

- a) For setting up of Input Production Units, 100% assistance to State Govt./Govt. Agencies upto a maximum limit of Rs.190.00 lakh/unit for 3000 TPA production unit under PKVY scheme.
- b) For setting up of State of art liquid/carrier based Bio-fertilizer/Bio-pesticide units.- 100% assistance to State Govt./Govt. Agencies upto a maximum limit of Rs.160.00 lakh/unit for 200 TPA production unit.

3.36 When asked about steps being taken to promote use of bio-fertilizers among farmers, the Department stated that the Government is providing the following incentives to investors in infrastructure, manufacturing, quality assurance and farmers under National Mission for Sustainable Agriculture (NMSA) for setting up of Bio fertilizer and Organic Fertilizer testing Quality Control Laboratory, Assistance up to Rs 85 lakh maximum for new laboratory. Under PKVY scheme, to promote use of bio-fertilizers among farmers, the provision of action plan to adopt the cluster based organic farming by adopting integrated manure management for Rs. 3.75 lakh per cluster in three years will be provided to farmers.

Subsidy policy on Fertilizer

3.37 Since independence, the Govt. of India has been regulating sale, pricing and quality of fertilizers in the country to ensure adequate and timely availability of fertilizers at affordable price to farmers for maximizing agricultural production in the country and also food security for the people. Keeping this objective in mind, GOI passed the Fertilizer Control Order (FCO) under Essential Commodities Act (EC Act) in the year 1957. To regulate the distribution of fertilizer, the Movement Control Order was passed in 1973. At present of Dept. of Agriculture, Cooperation & Farmers Welfare is dealing with FCO and the

movement of fertilizers is being controlled by DOF in consultation and inputs from DAC and the State Governments.

Subsidy on Urea

3.38 The concession rate of indigenous urea is determined on the basis of Modified NPS and New investment Policy 2008. The difference in concession rate/Cost of import and net market realization is given as subsidy by the Government of India to the Farmers through fertilizer industry. Maximum Retail Price (MRP) of urea is statutorily controlled by the Government of India, which is at present, Rs.5360 per MT exclusive of local taxes and levies. The MRP also includes RS.180 per MT and Rs.200 per MT as dealer Margin for PSUs/Private owned companies and cooperatives respectively and Rs.50 per MT to retailers for confirmation on mFMS. The Government of India also reimburses the cost of transportation of urea subsidy from plant/port to the block level in form of freight subsidy.

3.39 When asked to provide details of subsidy on import and indigenous production of fertilizers in the country since 2009-10, the Department furnished following information :-

(Rupees in Crores)

Year	Imported Urea	Indigenous Urea	Total	Decontrolled P and K	Total Subsidy on fertilizers
2009-10	4603.00	17580	22183	39081	61,264
2010-11	6454.00	15081	24335	41500	65837
2011-12	13716.00	20208	37683	36089	70013
2012-13	15133.00	20000	35133	30480	65613
2013-14	11538.00	26500	38038	29301	67339
2014-15 (RE)	12100.00	38200	50300	20667	70967
2015-16	12300.00	38200	50500	20667	71167

BE: Budget Estimates, RE: Revised Estimates
Source: Central Statistical Organization (CSO)

3.40 The Department of Fertilizer in their background note submitted that subsidy was reported to have been introduced during 1977 for phosphate due to its high prices in the international market at that time. Government had introduced Retention Price Scheme (RPS) for nitrogenous fertilizers in November 1977. Subsequently, RPS was extended to phosphatic and other complex fertilizers from February 1979 and to Single Super Phosphate from May 1982, which continued up to 1991. Subsidy, later on, was also extended to imported phosphatic and potassic fertilizers.

3.41 The Department stated that Concession Scheme on decontrolled Phosphatic and Potassic (P&K) fertilizers was implemented w.e.f 1st April 2008 after approval of the Cabinet Committee on Economic affairs. Under the concession scheme the MRP of P&K fertilizers was fixed by Govt. of India and the difference in the delivered price of fertilizers at the farm gate and MRP was compensated by the Government as subsidy to the Manufacturers/Importers. With Changed parameters from time to time and revision of MRPs of DAP, MOP, MAP and complex fertilizers concession scheme was continued upto 31.3.2010. During implementation of the said Concession Scheme, the following drawbacks were observed:-

- (i) Subsidy implication was very high;
- (ii) Marginal response of agricultural productivity to additional fertilizer usage in the country had fallen sharply, leading to near stagnation in agricultural productivity and consequently agricultural production ;
- (iii) The fertilizer sector failed to attract investments;
- (iv) Innovation in fertilizer sector suffered, as very few products were introduced by fertilizer companies; and
- (v) The industry failed to focus on farmers leading to poor farm extension services which were necessary to educate farmers about the modern fertilizer application techniques, soil health and promote soil test based application of soil and crop specific fertilizers.

Fertilizer Management Strategies and Nutrient Based Subsidy for P & K fertilizers:

3.42 Management of soil fertility is going to be crucial to supply adequate amounts of nutrients for the targeted levels of food production. This warrants sound growth and infrastructure of fertilizer industry, fertilizer pricing and subsidy patterns and balanced & integrated nutrient management systems for varying soil and crop situations. When asked about the view of the Government for restructuring fertilizer pricing and subsidy, the Department have stated that the Government is committed to supply fertilizers to the farmers at affordable prices and, accordingly, provides subsidy on certain fertilizers. At the same time, the Government is concerned over the large fiscally unsustainable subsidy bill. The pricing pattern of fertilizers, hitherto, has also contributed to imbalanced fertilizer use and deterioration of soil health. Therefore,

restructuring of fertilizer pricing and subsidy, providing for reduction in subsidy and promotion of balanced fertilizer use, became quite relevant. The Govt. of India has, accordingly, taken historical policy decision of introduction of Nutrient Based Subsidy (NBS) w.e.f. 1.4.2010. Under the NBS policy a fixed subsidy, decided on annual basis, is provided on each subsidized P&K fertilizers depending upon its nutrient content. The subsidy rates are fixed taking into consideration all factors including the prevailing international and domestic prices, inventory levels and exchange rate. The Maximum Retail Prices of P&K fertilizers are open and are allowed to fixed by the fertilizer companies at reasonable rates. The move would broaden the basket of fertilizers and enable fertilizer use as per soil and crop requirements. Primary nutrients, viz., N, P and K and nutrient Sulphur 'S' contained in the fertilizers are eligible for NBS. The NBS to be paid on each nutrient, viz. N, P, K and S, will be decided annually by the Govt. and will be converted into subsidy per tonne for each subsidized fertilizer. Additional subsidy for fertilizers fortified with zinc and boron will be paid at the rate of Rs.500 and Rs 300 per tonne, respectively. The Govt. of India has also included SSP under NBS w.e.f. 1.5.2010 to promote its use. The Government is also promoting customized fertilizers based on area and crop specificities. Permission for manufacture and sale of customized fertilisers shall be granted to the manufacturing companies whose annual turnover is Rs.500 crores or above, have soil testing facility with annual capacity of 10,000 samples per annum and have analyzing capacity for NPK, micro and secondary nutrients.

3.43 The Department of fertilizer submitted that it was expected that decontrol of the sector would promote competition leading to efficiencies in production and import. In the long run, the policy is expected to stabilise demand and supply situation and also contain the subsidy outgo, besides promoting balanced fertilization of soil. In spite of these measures, the major objectives of NBS policy of balanced fertilization is yet to be achieved. Exclusion of urea from NBS and decontrol of P & K fertilizers has also led to imbalanced application of nitrogen vis-à-vis phosphatic and potassic fertilizers (NPK consumption ratio : 8.0:2.7:1 and 6.8:2.4:1 in 2013-14 and 2014-15 respectively).

3.44 While replying to the query of the Committee about effect on use of chemical fertilizers in the country after implementation of Nutrient Based Subsidy (NBS) regime, the Department of Agricultural Research and Education submitted as under:

"M/s Ernest and Young studied the impact of NBS on use of chemical fertilizers in the country and submitted the report to Department of Fertilizer, Ministry of Chemicals and Fertilizers. According to the report due to the significantly low prices of Nitrogen (mainly urea which is not currently under

NBS region), there was significant destruction of fertilizer consumption ratio post NBS. Thus, NBS scheme needs a relook."

3.45 During the evidence when the Committee brought the attention on shortcomings of present subsidy policy of the Government, the representative of Department of Agriculture, Cooperation and Farmers Welfare stated as under:-

‘...उर्वरकों के बारे में इस समिति के सामने पहले भी चर्चा हुई थी। मैंने उस समय यह निवेदन किया था कि सरकार की जो उर्वरक नीति है, वह सिर्फ कुछ विशेष उर्वरकों को ही प्रोत्साहित करती है। इस तरीके का मतलब यह हुआ कि चाहे जैविक खाद हो या लिक्विड फर्टीलाइजर हो, किसानों को हतोत्साहित करता है। अगर उन्होंने उर्वरक लगाए तो सब्सिडी मिली लेकिन अगर जैविक खेती की तो कुछ नहीं मिला। हमारे सामने चुनौती यही है। होना यह चाहिए कि समान रूप से किसान जो चाहे उगाए। आपने भी माना है कि इसे किसान पर छोड़ दिया जाना चाहिए क्योंकि अनुदान देकर किसान को एक तरीके से एक दिशा में ले जा रहे हैं। आपने सही कहा कि वह दिशा उर्वरक में और यूरिया की तरफ है क्योंकि यूरिया में मैक्सिमम अनुदान दिया जाता है। फास्फोरस और पोटैश में कम दिया जाता है और बाकी में तो दिया ही नहीं जाता है। मेरा कहना है कि तो फिर क्यों किसान जैविक खेती को अपनाएगा। इसके बाद दिक्कत सब्सिडी की आती है क्योंकि इस समय खाद पर सबसे ज्यादा बजट है, करीब 30,000 करोड़ का बकाया हर साल रहता है। एक लाख करोड़ रुपए की राशि है, रासायनिक उर्वरकों पर अनुदान दिया जाता है। जैसा आपने कहा कि बाकी चीजों पर भी अनुदान दिया जाए। मेरा कहना है कि यह संभव नहीं हो पाएगा। यह सरकार की क्षमता से बाहर है। मेरा कहना है कि एक लाख करोड़ रुपए हर किसान को बांट देया जाए फिर चाहे वह देशी उर्वरक लगाए या कुछ न लगाए।

3.46 Further elaborating on the issue, he stated as under:-

‘...महोदय, एक तरीका यह है और इसके अलावा दूसरा तरीका भी है, जो इससे ज्यादा अच्छा है। रासायनिक उर्वरक में सबसे ज्यादा बढ़िया लिक्विड उर्वरक है। लेकिन इस पर अनुदान नहीं है इसलिए किसान नहीं लेता है। यदि सरकार किसी पर अनुदान देती है तो उसे प्रेरित करने के ही रखिए, लेकिन यूरिया में सब्सिडी घटा दीजिए और डीएपी और एमओपी में दे दीजिए, लेकिन उस समय शायद विभाग को वह माफिक नहीं आया। मैं आपकी बात से सौ फीसदी सहमत हूँ कि यदि हमें उर्वरकों के असंतुलित उपयोग को रोकना है तो यही करना पड़ेगा। हमें बढ़िया चीजों पर देना चाहिए और घटिया

चीजों से हटा देना चाहिए। मेरा सुझाव है कि आप अनुदान खत्म कर दीजिए। एक लाख करोड़ रुपए की राशि क्षेत्रफल के आधार पर किसानों को बांट दी जाए और वह अपने आप तय करे कि रासायनिक खाद का इस्तेमाल करना है या जैविक खाद का इस्तेमाल करना है। हम जो भी तय करते हैं, त्रुटियां वहीं से शुरू होती हैं।...’

3.47 On the above issue, the representative of Department of Fertilizer stated as under:-

‘... मैं बताना चाहता हूँ कि रासायनिक खाद की आवश्यकता के बारे में कृषि मंत्रालय और स्टेट्स हमें जो मात्रा बताते हैं, उसकी सप्लाई की जिम्मेदारी हमारा विभाग लेता है। उसके ऊपर बजट में जो सब्सिडी दी जाती है, वह कंपनी को देते हैं। हम अभी केवल रासायनिक खाद पर सब्सिडी दे रहे हैं। वर्ष 2003-04 में बजट में सब्सिडी के रूप में 11840 करोड़ रुपये का प्रावधान किया गया था, जो इस वर्ष के बजट में 77000 करोड़ रुपये से थोड़ा ज्यादा है। इस साल सब्सिडी में से 52000 करोड़ रुपये यूरिया के लिए है और बाकी 25000 करोड़ रुपये फास्फेटिक एवं पोटाशिक फर्टिलाइजर्स के लिए हैं। हम दो तरह से सब्सिडी देते हैं - यूरिया में सब्सिडी देने के लिए एक फिक्स्ड प्राइस होता है और सब्सिडी वैरिएबल होता है। पीएनके फर्टिलाइजर्स में प्राइस वैरिएबल होता है और सब्सिडी फिक्स्ड होती है। ये दो अलग-अलग पॉलिसीज हैं। हमें कृषि मंत्रालय और आईसीएआर से जितने तथ्य मिले हैं, रेशियो ऑफ बैलेंसड यूज ऑफ फर्टिलाइजर्स एवं एनपीके चार अनुपात दो अनुपात एक होना चाहिए। लेकिन यह रेशियो काफी बिगड़ गया है, किसी-किसी अंचल में यह आठ अनुपात दो अनुपात एक हो गया है। ऐसे कई अन्य राज्य भी हैं। नेशनल सेंटर फॉर एग्रीकल्चरल इकोनोमिक्स एंड पॉलिसी रिसर्च के रमेश चन्द्र जी ने एक स्टडी की है, उनका मानना है कि खाद की आवश्यकता चार फैक्टर्स पर निर्भर करती है - स्वाइल फर्टिलिटी स्टेटस, क्रॉपिंग पैटर्न, प्रोडक्टिविटी पर यूनिट ऑफ लैण्ड और मेथड ऑफ यूज ऑफ फर्टिलाइजर। कितनी खाद की आवश्यकता है, वह इन चारों चीजों पर निर्भर करती है। देश के अलग-अलग अंचलों के लिए अलग-अलग रेशियो होगा क्योंकि उनमें ये चारों चीजें अलग-अलग होती हैं। इसी आधार पर उन्होंने स्टडी की है कि अलग-अलग प्रदेश में कितना एनपीके प्रयोग होना चाहिए और उससे कंपेयर किया जाए कि असल में कितना व्यवहार हो रहा है। वह स्टडी दिखाती है कि छः राज्यों - आंध्र प्रदेश, असम, बिहार, हरियाणा, झारखण्ड और पंजाब में एक्सेस यूज ऑफ नाइट्रोजन हो रहा है। फास्फेट का प्रयोग आंध्र प्रदेश, गुजरात और तमिलनाडु में थोड़ा ज्यादा है। पोटाशिक फर्टिलाइजर्स का प्रयोग लगभग सारे प्रदेशों में कम है, असम थोड़ा ज्यादा है, लेकिन बाकी सभी प्रदेशों में कम है। यह स्टडी दिखा रहा है कि बैलेंस यूज तो नहीं हो रहा है। आपने कहा कि हम इस बारे में क्या कर सकते हैं? इस संदर्भ में मैं कहना चाहता हूँ कि भारत सरकार ने निर्णय लिया है कि

सोइल हेल्थ सभी किसानों को दिया जाए और सोइल हेल्थ कार्ड के आधार पर जितना रिक्मण्डिड खाद किसानों को उपलब्ध करवाया जाए। यह बहुत अच्छा सुझाव है और इसको लागू करने के लिए हम समर्थन करते हैं। अगर सोइल हेल्थ कार्ड से फर्टिलाइजर यूज को लिंक कर दें तो सोइल हेल्थ अच्छी रहेगी, सब्सिडी भी रिश्नलाइज़ होगी। आपने कहा कि माइक्रोन्यूट्रिएंट और अन्य न्यूट्रिएंट को बढ़ावा दिया जाना चाहिए। हमने इस बारे में कदम उठाए हैं, जिंक कोटेड और बोरेन कोटेड यूरिया को अलग से सब्सिडी दे रहे हैं और नीम कोटेड का भी हम प्रमोशन कर रहे हैं। हम लोग लिक्विडी फर्टिलाइजर को भी बढ़ावा देने पर विचार कर रहे हैं, इसके लिए एक प्रस्ताव हमारे पास आया है। एक वर्किंग ग्रुप इस बारे में स्टडी कर रहा है कि रिक्मण्डिड डोज होगा और किस तरह से इसे किया जाएगा। हमारी इंटर मिनिस्ट्रीयल कमेटी जो कि सब्सिडी तय करती है, उसके सामने एक महीने में प्रस्ताव आएगा, जिसमें निर्णय लिया जाएगा। आर्गेनिक फर्टिलाइजर को अभी हमने नहीं लिया है, लेकिन कमेटी की अनुमति होगी तो हम उसको सरकार के सामने रखेंगे। जिस प्रकार से हम केमिकल फर्टिलाइजर को सब्सिडी देते हैं, उसी प्रकार से इसको बढ़ावा देने के लिए यदि कोई अनुदान देने की आवश्यकता होगी तो हम उस पर विचार करेंगे।..’

B. CERTIFICATION FOR FERTILIZERS

3.48 Ensuring the availability of quality fertilizer is one of the major responsibility of Central and State Government. When asked to provide information about Government Agencies responsible for providing certification for chemical fertilisers in the country, the Department submitted as under:

"To ensure availability of quality fertilisers to farmers, the fertiliser was declared as an essential commodity in 1957. In sequel, the Fertiliser (Control) Order (FCO) was promulgated in March 1957 under section 3 of the Essential Commodities Act (ECA), 1955 to regulate quality, trade and distribution of fertilisers in the country. The FCO has since been revised and re-enacted in the year 1985. The fertilisers along with their specifications are included in the FCO after evaluation of their agronomic efficacy. As per clause 19 of the FCO, no person shall manufacture/import any chemical fertiliser for sale, which is not included in the FCO or not of standard prescribed in the FCO."

"To check the quality of the indigenous/imported chemical fertilisers, samples are regularly drawn by the notified fertiliser inspectors and tested in the notified fertiliser quality control laboratories. At present, there are 78 notified Fertilizer Quality Control Laboratories (FQCLs) in the country. Of these, 4 laboratories viz. Central Fertilizer Quality Control & Training Institute

(CFQC&TI) and its three Regional Fertilizer Control Laboratories (RFCLs) located at Navi Mumbai, Chennai and Kalyani are under the control of Central Government and the remaining are under the control of different State Governments. "

"There is a provision under clause 14 (3) of the FCO to obtain a certificate of manufacture from the registering authority of State Government for preparation of bio-fertiliser. Similarly, there is a provision under the clause 8 of the FCO to obtain authorisation letter from the notified authority of State Government for carrying on the business of selling of bio-fertiliser."

"There is no provision under the FCO to obtain certificate of manufacture for preparation of liquid fertilisers. However, persons desiring to manufacture liquid fertilisers are required to comply with the provision(s) of the Industries (Development and Regulation) Act. Any person intending to carry on the business of selling of liquid fertiliser is required to obtain authorisation letter under clause 8 of the FCO."

3.49 On the query of Committee regarding research/study conducted by respective Government Agencies before recommending any fertiliser for use in Agriculture, the Department submitted as under:

"In order to seek advise on the inclusion of a new fertiliser under the FCO and specifications of various fertilisers etc, the Central Government has constituted a Committee called the Central Fertiliser Committee (CFC) consisting of a chairman and ten other members having experience or knowledge in the field of agriculture/fertiliser. The CFC has further constituted a technical group consisting of a chairman from Indian Council of Agriculture Research (ICAR) and other members/scientists/experts from the field of agriculture."

"Generally, fertiliser companies submit the proposal to the Ministry for inclusion of any new fertiliser in the FCO along with its field trials results. Before inclusion of any new fertiliser in the FCO, the technical group examines the agronomic aspect, specifications and field trials' reports etc of the product. Agronomic field trails are required to be conducted by the company in minimum two cropping seasons under the aegis of a State Agriculture University or any other institute of ICAR. The report/recommendation of the technical group on the fertiliser is submitted to the CFC for further examination. The CFC after ascertaining the agronomic efficacy of the fertiliser

recommends to the Central Government for its inclusion in the FCO. Thereafter, the Central Government decides for inclusion of the new fertiliser in the FCO."

Chapter IV

Use of Pesticides in Agriculture Sector in India and its impact

4.1 Food and Agricultural Organisation (FAO) define pesticides as any substance or mixture of substances intended for preventing, destroying, or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances that may be administered to animals for the control of insects, arachnids, or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit. Also used as substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport.

4.2 Pesticides are substances meant for attracting, seducing, and then destroying any pest. They are a class of biocide. The most common use of pesticides is as plant protection products (also known as crop protection products), which in general protect plants from damaging influences such as weeds, fungi, or insects. This use of pesticides is so common that the term pesticide is often treated as synonymous with plant protection product, although it is in fact a broader term, as pesticides are also used for non-agricultural purposes. The term pesticide includes all of the following: herbicide, insecticide, insect growth regulator, nematocide, termiticide, molluscicide, piscicide, avicide, rodenticide, predacide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide, disinfectant (antimicrobial), and sanitizer. In general, a pesticide is a chemical or biological agent (such as a virus, bacterium, antimicrobial, or disinfectant) that deters, incapacitates, kills, or otherwise discourages pests. Target pests can include insects, plant pathogens, weeds, mollusks, birds, mammals, fish, nematodes (roundworms), and microbes that destroy property, cause nuisance, or spread disease, or are disease vectors. Although pesticides have benefits, some also have drawbacks, such as potential toxicity to humans and other species. According to the Stockholm Convention on Persistent Organic Pollutants, 9 of the 12 most dangerous and persistent organic chemicals are organochlorine pesticides.

Benefits of use of Pesticides

4.3 Pesticides use in agriculture has many positive as well as negative effects on agricultural productivity, soil health, quality of food, pest control etc. Positive effect of use of pesticides in agriculture

includes enhancing the agriculture production in India. Use of pesticides had been integral part of green revolution strategy in India by reducing the losses from weeds, diseases and insect pests that can markedly reduce the amount of harvestable produce. Use of pesticides also improves quality of crops/vegetables/fruits by avoiding pests which affects yield, taste and nutritional aspects. However, these positive aspects of use of pesticides are sometimes become costly due to their high prices. Pesticides are one of the major input which makes modern agriculture cost intensive. Apart from that, environmental consequences of use of pesticides are major factor which makes it imperative to analyse its pattern of use and take steps to save environment.

Requirement/demand of Pesticides in India

4.4 When asked to submit state-wise requirement/demand of pesticides in the Country, the Department submitted the following details:-

Statewise requirement/demand of Chemical Pesticides during 2010-11 to 2014-15 & Projected demand for 2015-16

Unit: M.T.(Tech. Grade)

S. No.	States/UTs	2010-11	2011-12	2012-13	2013-14	2014-15 (Provisional)	Projected Demand for 2015-16
1	Andhra Pradesh	10000	9000	9000	5220	4350	4300
2	Bihar	851	870	930	975	1003	1034
3	Chhattisgarh	570	600				
4	Goa	8	9	10	10	10	7
5	Gujarat	2700	2100	1160	2300	2300	2300
6	Haryana	4120	4085	4200	4200	4200	4200
7	Himachal Pradesh	335	320			440	523
8	Jammu & Kashmir	3408	4693	1739	1943	2014	1964
9	Jharkhand	99	128	170	173	683	690
10	Karnataka	1700	1750	1750	1800	1800	2400
11	Kerala	633	591	591	581	1149	827
12	Madhya Pradesh	723	906	937	1025	825	817
13	Maharashtra	4315	8554	7855	10894	12663	11280
14	Orissa	811	532	706	1211	1564	990
15	Punjab	6500	6150	6350	6400	6420	6370

16	Rajasthan	2875	2775	2545	2675	2525	2350
17	Tamil Nadu	2472	2089	1968	2208	2141	2100
18	Telangana				4747	4320	4135
19	Uttar Pradesh	8372	8571	8860	9096	10453	10854
20	Uttarakhand	226	284	316	299	236	230
21	West Bengal	3550	3550	4000	3800	3800	3800
SUB TOTAL		54267	57557	53087	59556	62895	61171
North-Eastern							
22	Arunachal Pradesh	10	17		18	18	18
23	Assam	180	190	201	205	215	215
24	Manipur	34	35	35	35	34	34
25	Meghalaya	10	10	34	46	30	22
26	Mizoram	3	3	3	688	1228	1127
27	Nagaland		19		20	22	25
28	Sikkim						
29	Tripura	36	472	467	486	474	498
SUB TOTAL		273	746	740	1497	2022	1940
Union Territories							
30	A & N Islands		18	8			
31	Chandigarh						
32	Dadra & Nagar Haveli						
33	Daman & Diu						
34	Delhi	50			53		
35	Lakshadweep						
36	Pondicherry	47	47	47	47	48	43
SUB TOTAL		97	65	55	100	48	43
GRAND TOTAL		54637	58368	53882	61153	64966	63154

Source: States/ UTs Zonal Conferences on inputs

4.5 When asked to submit about consumption of Chemical Pesticides in Various States/UTs During 2010-11 To 2014-15, the Department submitted following details:-

Unit: M.T.(Tech. Grade)

S. No.	States/UTs	2010-11	2011-12	2012-13	2013-14	2014-15 (Provisional)
1	Andhra Pradesh	8869	9289	2803	4253	3895

2	Bihar	675	655	687	765	787
3	Chhattisgarh	570	600	812	1016	1020
4	Goa	9	8	9	9	9
5	Gujarat	2600	2190	1210	2330	1840
6	Haryana	4060	4050	4050	4080	4070
7	Himachal Pradesh	328	310	325	344	357
8	Jammu & Kashmir	1818	1711	1789	1723	1921
9	Jharkhand	84	151	151	430	650
10	Karnataka	1858	1412	1615	1735	1709
11	Kerala	657	807	712	1276	919
12	Madhya Pradesh	633	850	846	987	696
13	Maharashtra	8317	6723	6618	10969	11239
14	Orissa	871	555	606	1219	1680
15	Punjab	5730	5625	5730	5723	5699
16	Rajasthan	3623	2802	2559	2736	1457
17	Tamil Nadu	2361	1968	1766	2142	2096
18	Telangana				3812	2805
19	Uttar Pradesh	8460	8839	9057	10164	9867
20	Uttarakhand	199	206	247	174	133
21	West Bengal	3515	3670	3465	3190	3060
Sub Total		55236	52421	45057	59077	55908
North-Eastern						
22	Arunachal Pradesh	10	17		18	18
23	Assam	150	160	183	190	197
24	Manipur	30	33	31	31	30
25	Meghalaya	10	9	24	44	28
26	Mizoram	4	4	4	508	806
27	Nagaland		15		16	16
28	Sikkim					
29	Tripura	12	266	272	310	307
Sub Total		216	504	514	1117	1403
Union Territories						
30	Andaman & Nicobar		15	7		
31	Chandigarh					
32	Dadra & Nagar Haveli					

33	Daman & Diu					
34	Delhi	48			48	
35	Lakshadweep					
36	Pondicherry	39	38	41	41	42
Sub Total		87	54	48	89	42
Grand Total		55540	52979	45619	60282	57353

Import of Pesticides

4.6 Our country is yet to achieve self sufficiency in production of pesticides. When asked about details of import of pesticides during 2010-11 to 2013-14, the Department submitted following information:-

S. No.	Pesticides	Group	Qty. in M.T. (Tech. Grade)		Value in Rs. lakhs					
			2010-11		2011-12		2012-13		2013-14	
			Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
1	Aldrin	i	1053	4339	1034	5539	793	3809	732	3806
2	Allethrin	i	2	46						
3	Cypermethrin	i	17	282	0.41	4	8	20	4	11
4	DDVP	i	45	66	24	46			70	99
5	Dimethoate	i	58	109	152	299	182	422	46	106
6	Endosulphan	i	192	592						
7	Fenthion	i					0.01	0.02	35	173
8	Malathion	i	52	50			0.01	0.02		
9	Synthetic Pyrethrum	i	3	19						
10	Others Insecticides	i	17257	142478	18388	156952	17157	173226	19563	194422
11	Maneb	f					0.02	1	3	18
12	Sodium Penta Chlorophenate	f			3	37			0.001	0.05
13	Thiram	f					121	115	97	105
14	Zineb	f	3	7	3	9			3	12
15	Others Fungicides	f	3958	20107	3976	27648			4554	39665

16	2:4-D	h	204	486			0.48	78	0.001	0.005
17	Copper Oxychloride	h	0.80	7	1	2	0.08	1	48	122
18	Isoproturon	h	23	64						
19	MCPA	h	46	95	2	3	31	92		
20	Others Herbicides	h	3775	27693	4689	36838	7107	57625	10056	85938
21	Aluminium phosphide	fm	187	2183	31	561	23	741	8	61
22	Methyl bromide	fm	448	955	655	1667	779	2591	460	1652
23	Others Fumigants	fm					3270	22010		
24	Gibberallic Acid	pgr	24	2069	25	2357	27	3311	37	5278
25	PGR	pgr	337	633	192	868	280	937	694	1513
26	Disinfectants	misc	144	336	98	357	929	2237	1249	2785
27	Paper Impregnated	misc			2	1	18	502		
28	Pesticides, not specified	misc	651	1495	2340	7815	1263	6928	2255	13747
29	Repellant for Insect	misc	43	296	23	194	18	151	23	269
30	Weedicides and weed killing agents	misc	26	898	39	1648	24	1882	54	3857
31	Other Similar Products N.E.S.	misc	25448	81864	26972	97248	32990	128940	37386	158571
	Total		53996	287170	58648	340093	65018	405618	77376	512209

SOURCE: (Dte. General of Commercial Intelligence & Statistics, Kolkata)

Note: i - Insecticides, h- Herbicides, f- Fungicides, fm - Fumigants, pgr - Plant growth regulator, misc- Miscellaneous.

4.7 On the issue of production and use of pesticides in the country, the representative of Department of Chemicals and Petrochemicals stated as under:-

'...When we talk about chemicals in agriculture, there are two sets of chemical sectors in agriculture. One is fertilisers and another is the set of chemicals used under the name of pesticides. They are pesticides, insecticides, herbicides, weedicides etc. Now, I would like the Committee to know about the production details and usage details in India. Our installed capacity for production of agrochemicals – I mean the pesticides and not the fertilizers – is around three lakh tonnes and our utilisation of the installed capacity is around 60-62 per cent. Our complete production is about 1.78 lakh tonnes, out of which 50 per cent is exported and 50 per cent is used in the local market. Then, 22.22 lakh tonnes are imported. These are the figures with regard to the chemical grades, the final product of the insecticides, but

the per hectare usage of these insecticides/pesticides is around 600 grams per hectare in India. We have a total 200 million hectares under cultivation. If we put the figures together, it comes to about 120 million kilograms of insecticides to be used. It means that about 12 lakh tonnes of pesticides are being used. Now, there is a huge variation between the local production and what is actually being used on ground. That is being complained about by the Indian industry. They are coming and complaining that this is being brought in by the multinational companies and they are not bringing the chemical grades, but they are bringing the formulation and making the final product in India and then, pushing it into the Indian market. That is where all the issues crop up. Hon. Members are telling that some banned products are found in the market and some multinational companies are pushing their products. Therefore, the usage is large compared to what it should be. That explains all the issues with regard to the usage on ground, the imbalances in the usage on ground....'

Impact of Pesticides on Agriculture and Allied Sector in the Country and on human health

4.8 Modern farming needs for achieving higher crop productivity on sustainable basis with the care on maintaining the health of the agro-ecologies is the thrust in research in various institutes of the Indian Council of Agricultural Research. Agro-chemicals do form the hub in the accelerated crop commodity production to satiate the ever-increasing consumer demand for food, fodder and fibre. While fertilizers have been placed as the noble support for higher farm productivity, chemicals for crop health management have not been accepted in the same vein. The production capacity of pesticides in the country is more than 1,50,000 metric tonnes annually (Industry source) with more than 219 technical grade/manufacturing Units and over 4000 formulation Units. The production of pesticides in the country has come down to nearly 70,000 MT, during 2011-12, in last five years; when it was more than 80,000MT. There may be around 500 pesticides formulators spread in the country. The projected demand for technical grade chemical and biopesticides for the year 2012-13 was around 55,000 and 8000 MT, respectively.

4.9 There is no authentic data on the manufacture and use of biopesticides (both botanical origin pesticides and microbial control agents). However, their consumption and use has increased based on the fact that a large number of registrants have got registration to commercially manufacture these products for marketing. The research on biopesticides have generated formulation technologies along with potent strains of the biological organisms by ICAR institutes and State Agricultural Universities and licensed to many commercial organizations. These licenses have taken up commercial production after getting

registration with Registration committee of Central Insecticide Board. These products have been in use in IPM of pests (insects, and diseases).

Integrated Pest Management has been the policy of the government to stimulate judicious and need-based use of chemical pesticides as well as those of biological origin such as botanical pesticides (neem-based and plant origin pesticide formulations, microbial preparations such as that of *Bacillus thuringiensis* (Bt)). The tool box of IPM lays emphasis on pest management through a combination of agronomic, chemical and biological methods. Timely sowing, use of tolerant and resistant plant varieties, transgenic pest resistant crop, biocontrol agents, and need-based application of chemical pesticides are the basic tools of IPM tool box. A number of novel pesticide chemistries that have low impact to agro-ecologies and natural habitats and also requiring small dosage per unit farm land have revolutionized the pesticide application in crops in a large measure. The general trend in the reduction of pesticide use is due to low dosage pesticide chemistries, particularly in the class of herbicides and insecticides that have been now registered for manufacture and use in the country.

4.10 Pesticide contamination and their residues in food commodities and feed have been a major concern in consumers in recent times. While the IPM ensure the safe and judicious use of pesticides in agriculture, the effort to practice Good Agriculture Practice (GAP) With the visualization of higher care to avoid pesticide contamination in food and feed is being propagated to farmers. Used container management, management of pesticide applications and making farmers and farm labourers aware of the benefits GAP and other aspects are the ways in which risk due to pesticide contamination in food and feed can be reduced. IPM measures also reduce the pesticide contamination in food due to reduced pesticide use. The data generated over the last four years indicate that on national scale, the contamination varies between 1.7% to 2.2%. Violations under Prevention of Food Adulteration limit of maximum residues in commodities were also quite low. Over sixty thousand samples have been analysed so far under this project. The Plant Protection Division of Department of Agriculture and Co-operation funds this project and ICAR is operating it in 21 laboratories across various government departments. The recent upsurge in sap-sucking pests across crops has increased the insecticide consumption in many crops. Indian agriculture has been challenged due to short-fall of labour force during peak seasonal operation. However, the environmental contamination of chemical pesticides could be reduced by making the farmers and researchers aware, about timely, safe and proper application of pesticides.

4.11 On the query of the Committee regarding effect of unscientific use of pesticides on human health, the Department of Health Research submitted as under:

"Excessive/unscientific use of pesticides has caused tremendous harm to the environment as well affects human population indirectly. Pesticides caused various deteriorating health hazards in animals as well as human beings. The Department have mentioned about following effects on human health due to pesticides:-

1. **Organochlorines** : Acute ingestion of organochlorine insecticides can cause a loss of sensation around the mouth, hypersensitivity to light, sound, and touch, dizziness, tremors, nausea, vomiting, nervousness, and confusion. Lindane can cause breast cancer and acts as nerve poison. It also affects the reproductive system and is known as carcinogen. DDT (Dichloro diphenyl trichloro ethane) a common insecticide, affects the nervous system and could act as a carcinogen.
2. **Organophosphates and Carbamates** : Acute organophosphate and carbamate exposure causes signs and symptoms of excess acetylcholine, such as increased salivation and perspiration, narrowing of the pupils, nausea, diarrhea, decrease in blood pressure, muscle weakness, and fatigue.
3. **Pyrethroids**: Pyrethroids can cause hyper-excitation, aggressiveness, disturbed coordination, whole-body tremors, and seizures. They can cause an allergic skin response, and some pyrethroids may cause cancer, reproductive or developmental effects, or endocrine system effects."

PESTICIDES RESIDUE IN FOOD PRODUCTS

4.12 Pesticides residue in crops/vegetables/fruits pose danger to human health. There is possibility of entry of pesticides in food chain posing the danger of biomagnification. When asked about any study conducted to assess pesticide residue content in agricultural produce available in the market and being used by Restaurant/Hotels, the Department submitted that the Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare initiated the central sector scheme, Monitoring of Pesticide Residues at National Level (MPRNL) during 2005-06 to evaluate the status of pesticide residues in food commodities at national level with the participation of various laboratories across the country. Under the scheme, participating laboratories collect and analyse the samples of vegetables (cabbage, cauliflower, brinjal, tomato, okra, capsicum, cucumber bitter gourd, green peas, beans, green

chilli and coriander leaves), fruits (apple, banana, guava, grapes, pomegranate, mangoes, oranges and pineapple), spices (cardamom, cumin, pepper, fennel and coriander seeds), red chilli powder, curry leaves, rice, wheat, pulses, fish/marine, meat and egg, tea, milk and surface water the various markets such as retail outlets and agricultural produce marketing committee (APMC) markets, farm gate and organic outlets located at different parts of the country and analysed for the possible presence of groups of pesticide residues such as organo-chlorine, organo-phosphorous, synthetic pyrethroids, carbamates, herbicides. The Department further stated that 25 laboratories, which are NABL accredited as per ISO: IEC-17025: 2005, are collecting food commodities samples and analysed for the presence of pesticide residues:

1. Dept. of Entomology, Punjab Agricultural University, Ludhiana, Punjab
2. Project Coordinating Cell, All India Network Project on Pesticide Residues, LBS Building, Indian Agricultural Research Institute, New Delhi
3. ICAR Unit No.-9, BTRS Building, Anand Agricultural University, Anand
4. Dept. of Entomology, Mahatma PhuleKrishiVidyapeeth, Rahuri, Maharashtra
5. Dept. of Entomology, College of Agriculture, Kerala Agricultural University, Vellayani, Kerala
6. Division of Soil Sci. & Agril. Chemistry, Indian Institute of Horticulture Research, Hessaraghatta Lake Post, Bangalore, Karnataka
7. Dept. of Entomology, Rajasthan Agricultural University, Research Station, Durgapura, Jaipur
8. Professor JayashankarTelangana State Agricultural University, E.E.I. Premises, Rajendranagar, Hyderabad, Andhra Pradesh
9. Dept. of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu
10. Institute of Pesticide Formulation Technology, Sector-20, UdyogVihar, Gurgaon, Haryana
11. National Institute of Occupational Health, P. B. No. 2031, Meghani Nagar, Ahmedabad, Gujarat
12. Western Region Referral Laboratory, Department of Veterinary Public Health, Bombay Veterinary College, Parel, Mumbai, Maharashtra
13. MPEDA, MPEDA House, Panampilly Avenue, Kochi, Kerala
14. Pesticide Toxicology Laboratory, Indian Institute of Toxicology Research, Mahatma Gandhi Marg, Lucknow, Uttar Pradesh
15. Trace Organic Laboratory, Central Pollution Control Board, PariveshBhawan, East Arjun Nagar, Delhi
16. National Environmental Engineering Research Institute, Nehru Marg, Nagpur, Maharashtra
17. Regional Plant Quarantine Station, Haji Bunder Road, Sewri, Mumbai, Maharashtra

18. Regional Plant Quarantine Station, G.S.T. Road, Meenambakkam, Chennai , Tamil Nadu
19. AINP on Pesticide Residues, Directorate of Research, Research Complex Building, Kalyani, Nadia, West Bengal
20. Dept. of Entomology, Dr. Y.S.P. Univ. of Horticulture & Forestry, Nauni, Solan, Himachal Pradesh
21. National Plant Quarantine Station, New Delhi
22. National Institute of Plant Health Management (NIPHM), Pesticide Management Division, Rajendranagar, Hyderabad
23. Central Agriculture Research Institute (CARI), Port Blair, Andaman and Nicobar
24. Export Inspection Agency, Kolkatta
25. Export Inspection Agency, Mumbai

4.13 The Department also furnished following status of pesticide residues in food commodities during 2008-15:

Year	Number of samples analysed	Number of samples above MRL
2008-09	13348	183 (1.4 %)
2009-10	14225	147 (1.0 %)
2010-11	15321	154 (1.0%)
2011-12	16948	270 (1.6%)
2012-13	16494	403 (2.4 %)
2013-14	16660	458 (2.7%)
2014-15	20618	543 (2.6%)

4.14 The Department also furnished following status of pesticide residues in Pesticide monitoring data of Fruits and Vegetables of India:-

	Samples analysed	Above MRL
2008-09	6031	137(2.3 %)
2009-10	6353	102(1.6 %)
2010-11	7232	140 (1.8 %)
2011-12	8611	220 (2.5 %)
2012-13	9601	255 (2.6 %)
2013-14	9772	260 (2.7%)
2014-15	12832	346 (2.7%)

4.15 When asked about study conducted by the Department of Health Research regarding average dietary intake of pesticides residues per person, the Department submitted as under:

"ICMR's NIN had conducted Total Diet Studies, wherein pesticide residues were also analysed as one of the contaminants in the selected foods. This study was submitted to FSSAI/ MoHFW for establishing the MRLs of these pesticides."

4.16 On the query of the Committee regarding Bureau of Indian Standards or Food Safety and Standards Authority of India (FSSAI) has set any standard set for maximum pesticides residues in food products available for sale in the Indian market by the BIS or FSSAI, the Department submitted as under:

"The FSSAI has already set the Maximum Residue Limit (MRL) in food products (**Annexure V**)"

4.17 On the query of the Committee regarding agency responsible for ensuring compliance to WHO/FSSAI standards for pesticide residue in food products in the Country, the Department of Agricultural Education and Research stated as under:

"The DAC & FW, Min. of Agriculture and Food Safety and Standards Authority of India (Ministry of Health and Family Welfare) are responsible for ensuring compliance to WHO/ FSSAI standards for pesticide residue in food products in the Country."

Study/Research on impact of Pesticides on Human Health

4.18 When asked to submit the details of research done by ICMR/DHR on the issue of impact of chemical fertilizers and pesticides on human health, the Department stated as under:

"ICMR, an autonomous organization under DHR has been conducting research through its Institutes like National Institute of Occupational Health (NIOH), Ahmedabad, National Institute of Nutrition (NIN), Hyderabad and National Institute for malaria research. NIOH conducted several studies related to pesticides and human health since 1977. Few important studies are as follows: -

Monitoring of Pesticide Residues at National Level – Central Sector Scheme,

ICAR - Ongoing - Acute Neurological Syndrome among children, Muzaffarpur, Bihar (2013-15) [estimation of pesticides – 21 pesticides in water, and food grains], The work on acute encephalitis syndrome with respect to pesticides relationship is in progress at Malda, Bengal (2015 onwards) -

Environmental & bio-monitoring of women workers exposed to pesticides in tea plantation– (ROHC–B) -Ongoing - Poison Information Centre - Service to the public with acute pesticide poisoning -

Episodes of Endosulfan Poisoning in Jabalpur, M.P. -

Environmental Impact Assessment Study Near UCIL, Bhopal due to Allegedly improper disposal of Waste (Directed by Hon'ble Health Minister) -

Pesticides exposure among chili cultivators in Gujarat -

Health hazards in pesticides formulators -

Unusual illness allegedly produced by Endosulfan exposure, Kerala-NHRC

- Health monitoring of workers manufacturing and formulating organophosphate insecticides

- Cardiovascular toxicity among methomyl exposed workers

- Immunological profile in workers exposed to pesticides

4.19 When asked about plans to undertake research on the correlation between improper use of chemical fertilizers and pesticides on the health of the masses, the Department of Health Research submitted as under:

"ICMR has prepared a multi-centric study entitled "A Multi-centric study to assess the Health Effects of Pesticides on General Population". The main objectives of this study is to assess the health status of the population in areas with high and low pesticide usage in 5 selected states – UP, Punjab, Haryana, Maharashtra, Andhra Pradesh and estimation of the levels of pesticide residues and their metabolites in blood and urine samples. This study will cover ~150,000 individuals and 2% of the samples will be analysed for pesticide residues and their metabolites."

Presence of Pesticides in Human Blood Samples

4.20 On the query of the Committee regarding study made by Department of Health Research/ICMR regarding presence of pesticides in human blood samples, the Department submitted as under:

"A series of research studies carried out by NIOH related to pesticide residues in blood samples. A brief summary of 22 such studies is presented at **Annexure VI**. NIN has also completed a study on "Genotoxicological Effects of the Pesticides in the Farming community in Guntur District". As one of the objectives, pesticide residues were also analysed so as to assess the correlation with genotoxicological parameters. (Genotoxicity in agricultural farmers from Guntur district of South India—A case study- P R Jonnalagadda et al. Human and Experimental Toxicology 31(7) 741–747 2012)."

4.21 Northern States especially Punjab and Haryana have been pioneer States to benefit from Green Revolution. However, these States have also faced many harmful effects associated with excessive use of chemical fertilizers and pesticides. When asked about research done by Centre for Science and Environment in Punjab, wherein, they have found high level of pesticides in blood samples of local population, The Department of Health Research submitted as under:

"A study entitled "Analysis of Pesticide Residues In Blood Samples From Villages Of Punjab" was carried out by Centre for Science and Environment. Only twenty blood samples were selected randomly from 4 different villages of Punjab - Mahi Nangal, Jajjal and Balloh in Bhatinda district and Dher in Ropar district - and 14 organochlorines and 14 organophosphorus pesticides were analyzed. This study found pesticide residues in all the samples. The study mentions that each person is exposed to and carries a body burden of multiple pesticides which might be due to a combination of direct and indirect exposure to these pesticides. Major contribution to total pesticide concentration in blood samples from Punjab is of organo-phosphorus pesticides. This could be due to the fact that Punjab is primarily a agricultural state with one of the highest pesticide usage and the samples were taken from the farming community members wherein some exposure to pesticides is expected. However the study did not attempt to correlate the presence of pesticide to any observed health effects."

Effects of Improper Use of Chemical Fertilizers, Pesticides and other Potential Pollutants on Occupational Groups

4.22 On the query of the Committee regarding provisions made by Department of Health Research (DHR) for conducting research on effects of improper use of chemical fertilizers, pesticides and other potential pollutants on occupational groups such as farmers/factory workers, the Department submitted as under:

"DHR through ICMR has an institute National Institute of Occupational Health (NIOH), Ahmedabad which is dedicated to the study of health effects in occupational groups including the farmers and factory workers as well as the unorganized workers including small scale workers like gem polishers, slate workers, stone quarrying etc. NIOH has conducted studies on farmers/industrial workers (Brief summary findings are in **(Annexure VI)**)"

"Environmental & bio-monitoring of women workers exposed to pesticides in tea plantation– (ROHC–B) - Ongoing"

"Health hazards in pesticides formulators"

"Health monitoring of workers manufacturing and formulating organophosphate insecticides."

4.23 While elaborating on the focus and difficulties being faced while sponsoring studies related to assessment of impact of fertilizer and pesticides on human health, the representative of Department of Health Research stated as under:-

'....There has been limited research in India on the long term effects of pesticides. From the side of the Agriculture Department, they look at pesticides residues in food, in water etc. They do not look at the human health. वे मानस के स्वास्थ्य को नहीं देखते हैं, केवल क्रॉप और उसकी रेज़ीड्यूज़, फ्रूट और वैजीटेबल रेज़ीड्यूज़ की तरह देखते हैं। We assess the exposure by asking the people. But they are not able to correlate what is the level of pesticide in the environment, in the body and on the health? Many of these have health effects in the long term specially on the endocrine system, reproductive system and cancer etc. यह बहुत साल के एक्सपोजर के बाद ही ऐसी प्रॉब्लम्स होती हैं। एक-दो साल की स्टडी में इनको पता करना थोड़ा मुश्किल है। आईसीएमआर की एक नई इंस्टीट्यूट बनी है, National Institute of Research on Environmental Health in Bhopal and the other one is the National Institute of Occupational Health, Ahmedabad यह वर्ष 2011 में बनी है। The proposal is to work along with the Ministry of

Agriculture and undertake a study on effect of pesticides on health, the way that you were mentioning, it can be done in different parts of the country also. But it will require a good funding in order to do a good research study. My major limitation now is the amount of funding that is available to the ICMR. कारसगोड एंडोसलफान का स्टडी उन्होंने ही किया था। भोपाल के इंस्टीट्यूट में हम इस मुद्दे को ले जा सकते हैं। Indian population is going to suffer when we reduce the amount of research that we are doing on these important topic. So many good research projects we have put on hold. मैं सिर्फ यह कहना चाहती हूँ कि आईसीएमआर और डीएचआर का बजट हर साल घटता जा रहा है। डॉ. धालीवाल ने बहुत बड़ा प्रपोज़ल तैयार किया है। It is already very small. We have a Budget of only Rs.500 crore per annum. Even that has been further cut. हमने पिछले हफ्ते प्रधानमंत्री जी के साथ एक बैठक हुई थी, उसमें यह रेज़ किया था कि वैज्ञानिक डिपार्टमेंट्स की बजट घटती जा रही है। We are ready to undertake this type of study. It is a high priority for our country. We can look at chemical, fertilizers and also bio-pesticides, organic fertilizers and we can launch a study in different parts of the country to see the long term effects by working along side with the Ministry of Agriculture. आप लोग संसद में भी इस पर विचार कर सकते हैं।..’

4.24 When asked about ways by which harmful impact of chemical fertilizers and pesticides on human health can be reduced/ contained, the Department of Health Research submitted as under:

"The harmful effects can be avoided by following Good Agricultural Practices, for the respective pesticides and fertilizers. These GAP are widely publicized by the Ministry of Agriculture. These include the following

- Proper of use of PPEs
- Increasing awareness among the users for scientific/proper handling and mixing of pesticides
- Imparting knowledge about the toxicity of their improper use
- Increasing awareness about the use of recommended quantity and frequency of pesticides to control the pest and informing about the dangers of exceeding these values.
- Encouraging use of bio-pesticides

Use of DDT in Agriculture

4.25 When the Committee pointed out that DDT which is banned for use in agriculture is being frequently sold and used by farmers in Mizoram, the representative of Department of Health research responded as under:-

".....One of the issues that was raised was that even though DDT is banned yet it is still being used. It is banned for all other things including endosulfan that has been banned by the Supreme Court all over the country. It is legally not permitted. All the pesticides that were available were given permission to be exported. Ideally speaking, there should be no stores of endosulfan within the country. But we are not the enforcing authority. So, we do not know whether it is actually so or not. DDT is primarily used for vector control. It is banned for all other agricultural uses. But since it is being produced, there is some pilferage and some people who siphon off the DDT and use it for agricultural use, that is again an implementation issue on which we cannot say. They are also looking at the alternatives which are available. But the DDT is the most cost effective pesticide as of now. Again the National Vector Control Programme of the Ministry of Health would be the best person to respond as to whether or after how many years we can phase out the DDT totally from the country. Most of the other recommendations were for better pesticides and better seed which primarily is with the Ministry of Agriculture...."

Insecticide Act 1968

4.26 The Committee observed that as per Central Insecticides Act, 1968, objectives of Central Insecticides Board includes to furnish advice to the Central/State Government on the risk to human beings and animals involved in the use of insecticides and safety measures necessary to prevent such risks. On the query of the Committee regarding research/study conducted by the Central Insecticides Board before recommending any insecticides for use in Agriculture, the Department of Agriculture, Cooperation & farmers Welfare submitted as under:

"The insecticides are regulated under the Insecticides Act, 1968 and the Insecticides Rules, 1971 framed there under. The Act regulates import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animals, and matter connected

therewith. Section 4 of the Insecticides Act, 1968 provides for constitution of the Central Insecticides Board (CIB) to advise the Central Government and State Governments on technical matters arising out of the administration of this Act and to carry out other functions assigned to the Board by or under this Act. The Central Insecticides Board does not conduct any research/study, *per-se*. However, based on national and international literature/information available, it advises government on the issue related to risk to human beings and animals involved in the use of insecticides and safety measures necessary to prevent such risks. For registration of a pesticide, the applicant is required to submit studies on the following four parameters: (i) Chemistry (ii) Bio-efficacy (iii) Toxicity and (iv) Packaging. The bio-efficacy studies are required to be conducted from State Agriculture Universities or ICAR Institutes. Thereafter, the Registration Committee constituted under section 5 of the Insecticides Act, 1968, registers insecticides after scrutinizing formulae, verifying claim of efficacy and safety to human beings and animals, specifying the precautions against poisoning and any other functions. The Committee has evolved exhaustive guidelines/data requirements for this purpose. The Registration Committee may refuse registration of pesticide whenever issues pertaining to safety have not been satisfactorily adhered to. In the past, the Registration Committee has refused registration of 18 Pesticides/Insecticides. **(annexure-VII).**"

4.27 When asked about provision for periodic evaluation of impact of insecticides on human and animal health in the Insecticides Act, 1968, the Department of Agriculture, Cooperation & Farmers Welfare stated as under:

"There is no specific provision for periodic scientific evaluation of impact of insecticides on human and animal health in the Insecticides Act, 1968. However, as and when the information about toxic effect of any insecticides or the information that particular insecticide is banned/severely restricted in other countries comes to the notice of the Government, such insecticides get reviewed by Expert Committees constituted from time to time. On the basis of the recommendations of such Review Committees, the Government has banned 34 insecticides/insecticides formulations, withdrawn 7 insecticides and restricted 13 insecticides for use in the country **(Annexure VIII & IX)**. In view of the European Food safety Authority report about posing risk by use of neonicotinoid pesticides on bees, Government has constituted a Committee of Experts on 8th July, 2013 under

the chairmanship of Dr. Anupam Verma, Adjunct Professor (Retd.), Indian Agriculture Research Institute, Pusa, New Delhi to review the use of 6 Neonicotinoid pesticides registered in India. Further, in the wake of the tragic incident in Bihar where 23 school children died after eating midday meal allegedly contaminated with monocrotophos, this Department vide its order dated 19th August, 2013 entrusted this Expert Committee to also review 66 pesticides which are currently banned/restricted/withdrawn in other countries but continue to be registered for domestic use in India."

"This Expert Committee has already completed its review of neonicotinoid pesticides and recommended continuance of their use in India till robust scientific data on adverse effect on honey bees is brought to light. The Committee has also recommended further scientific studies for assessment of risks to honey bees; and display of cautionary statements like 'Do not spray during flowering of the crop' on formulations for foliar sprays, and "Use with care to avoid air/dust contamination of the cropping area" for seed treatments and soil application formulations on labels and leaflets of neonicotinoid pesticides. The Department has accepted the Expert Committee recommendations. The report of Committee of Experts on review of 66 pesticides is at final stage and is likely to be submitted to this Department shortly. A view will be taken on continued use or banning of these 66 pesticides on the basis of the report. Section 27 of the Insecticides Act, 1968 also provides prohibition of sale etc. of insecticides for reasons of public safety and section 28 provides for notification of cancellation of registration etc."

4.28 On the query of the Committee regarding pesticides banned for agricultural use based upon periodic scientific evaluation, the Department Agriculture & Farmers Welfare submitted as under:

"Based on the recommendations of the Expert Committees constituted from time to time for reviewing use of insecticides, this Department has banned 32 insecticides/insecticides formulations for import, manufacture and use in the country. Further, 2 insecticides / insecticides formulations were banned for use in the country but their manufacture is allowed for export and 7 insecticides were also withdrawn for use (**Annexure-VIII**). 13 pesticides were restricted for use in the country. (**Annexure-IX**)."

4.29 When asked about the role of ICAR/ Department of Agriculture Research and Education under Insecticides Act, 1968, the Department stated that use of pesticides in Agriculture is regulated under the Insecticide Act 1968. Pesticides used in Agriculture have to be registered under the Act by CIBRC under the Min of Agriculture. ICAR offers its comments on bio efficacy, one of the essential requirements for its registration. Comments and approval are also given based on degradation of the pesticides to levels below detection at the recommended doses and duration of crops. These practices when followed do not adversely affect the soil and human health and productivity.

4.30 During the evidence, the representative of Department of Chemical and petrochemical have brought the attention of the Committee regarding issues in administration of Insecticides act, 1968. On this issue, the representative of the Department stated as under:-

".....The second set of issues I would like to raise is with regard to the administration of the pesticides in India. As hon. Member has said, there is a terrible confusion in the administration of the pesticides in India. The Pesticides Act was enacted by Parliament in 1968. That was when the Green Revolution was at its peak. The Green Revolution was nothing except three things they were promoting. The first one was to use the quality seeds. The second one was to use the fertilisers, which were basically the NPK and not the micro-nutrients. The third one was to use flood irrigation which is also very dangerous to the plants. With these three things at that time, the Green Revolution achieved good results. That is not the actual agriculture; that is only a very primitive way of looking at the agriculture. The next stage was to go to what it is, how it is being done in Israel, Australia and western countries. The country was never focused on that. Till today, the Agriculture Department, I am sorry to say, has been only promoting it. I have been a part of the Agriculture Department. I have been Agriculture Production Commissioner, been Agriculture Commissioner and Secretary (Environment) also. So, I am little personally conversant with the whole gamut of issues. At that time, the Act was administered by the Ministry of Agriculture. In the due course, when different aspects of agriculture have got specialised and have got diversified, the Act still continues to be administered by the Department of Agriculture whereas the production of the agrochemicals lies with the Department of Chemicals and Fertilisers. Now, there is a dichotomy."

4.31 When asked about the nature of conflict in Administration of Insecticides Act, the representative of Department of Chemical and petrochemical stated as under:-

"...The user department is the Agriculture Department. As of today, the regulatory authority of the product is also with the Agriculture Department. Normally, in the administration, there is a clash of interest. My view is that it should not be with the user department. Normally, it is not, but somehow historically, it has continued with them. I believe that there is a problem there. First, we need to integrate the administration. I would not be appropriate for me to tell

that it should be brought to the Chemicals Department, but I can only say that there is a very significant and immediate need to integrate the administration of the insecticides. Since the Government has already created the Department of Chemicals and Fertilisers and the mandate is production, I believe that it naturally lies with the Ministry of Chemicals and Fertilisers...."

4.32 While drawing attention of the Committee regarding need of revision of Insecticides Act, 1968, representative of the Department of Agriculture, Cooperation & Farmers Welfare on the issue, stated as under:-

‘...आपने पूछा है कि हम इसके लिए क्या कर सकते हैं। हमारा इनसेक्टीसाइड्स एक्ट वर्ष 1967 का है। वर्ष 2008 में हमने एक नया विधेयक प्रस्तुत किया था, जो उस समय की कृषि संबंधी स्थायी समिति के पास विचार के लिए आया था। समिति द्वारा अपनी अनुशंसा दिए जाने के बाद से वह विधेयक सदन में विचाराधीन है। हम आज अपने को इस स्थिति में पाते हैं कि हम अपने अधिकारियों को इंस्पेक्टर की पावर्स दे सकते हैं, लेकिन हम उस कानून के तहत यह पावर नहीं दे सकते हैं कि कोर्ट में जाकर केस दाखिल करें। यह अधिकार सिर्फ राज्य सरकारों के पास है। राज्य सरकारों, जो भी वजह हो, काम करने में तत्पर हैं और कुछेक तत्पर नहीं हैं। उस नए विधेयक में हमने यह प्रावधान किया था कि हमें भी यह अधिकार मिलना चाहिए कि हमारे इंस्पेक्टर डायरेक्टली केस दाखिल कर सकें। जब हम रेड करते हैं, और पाते हैं कि वह नमूना मानक के विपरीत है तो हमें कोर्ट में जाने का भी अधिकार होना चाहिए। वह विधेयक अगर इस बार पार्लियामेंट में पास हो जाएगा तो इससे हमें कुछ ज्यादा अधिकार मिलेंगे जिनसे हम इस चुनौती का सामना करने की स्थिति में रहेंगे। उसका सामना करने की स्थिति में हम रहेंगे। इस समय जो अधिकतम सजा है इंसेक्टीसाइड एक्ट में, उसमें दो साल की कारावास का प्रावधान है। अगर वह दुबारा करे, तब तीन साल का है। जो नया विधेयक है, उसमें शायद पांच साल है, उसमें राशि और कारावास अधिक है। मैं आपसे सहमत हूँ कि घटिया कीटनाशक से ज्यादा मुनाफा कर लिया या दवा मुनासिब नहीं हुई। इससे यह हो जाता है कि जो कीड़ा है वह रिजिस्टेंस अपना लेता है और उस कीड़ों के ऊपर बाद में सही कीटनाशक भी असर नहीं करता है। हम चाहते हैं कि वह विधेयक जल्दी से पारित हो तो हमें शक्ति मिलेगी और हम इनके ऊपर अंकुश लगाने की स्थिति में होंगे।...’

Role of ICMR on the board of Central Insecticides Board

4.33 Director General of Indian council of Medical Research is represented in the Central Insecticides Board. When asked about kind of inputs provided by the DG, ICMR to the Central Insecticides Boards on toxicity and tolerance limits for pesticides residue and basis of these inputs, the Department submitted as under:

"The Central Insecticides Board has a detailed mechanism of review of toxicity data of a particular molecule. These toxicity data is generated on laboratory animals and submitted to CIB which has a panel of experts to review. Based on the data submitted the Expert Group recommends permitting of a particular molecule. ICMR/NIOH serves as one of the members of this Expert Group of CIB when the data is reviewed. Since the pesticides cannot be used unless the Registration is completed it is not possible to conduct human studies before the registration process is completed. As a general scientific principle toxicity and health effects experiments are usually conducted on laboratory animals (higher mammals like dog and monkey also, if required) and then extrapolated to the field and human exposure conditions."

4.34 On the query of the Committee regarding provision for furnishing periodic inputs by ICMR or Department of Health Research regarding toxicity of pesticides in the light of fresh research findings to the Central Insecticides Board, the Department submitted as under:

"The Central Insecticides Board regularly reviews the available literature and periodically examines the continuity of the use of a particular pesticide. If evidence of excessive toxicity is found those pesticides are removed from the list of permitted chemicals. As a members of the expert group reviewing the registration and use of pesticides, ICMR can also raise any issues which come to light to initiate a review of a particular molecule."

4.35 On the query of the Committee regarding submission of reports to Ministry of Agriculture for banning any particular pesticides, the representative of Department of Health research stated as under:-

'... As far as informing the Agriculture Ministry, insecticides are being monitored by the Insecticides Board of which Ministry of Health and the DHR is also a member. In that sense, information is provided to that Board and finally a consensus decision is taken by

that Board whether a particular formulation should be permitted or not. In that sense, our inputs are going through the approval process...'

4.36 Further elaborating on the above issue, the representative of DHR stated as under:-

'...सर, हम इसे चैक कर लेंगे, लेकिन जैसा वे कह रहे थे कि इनसैक्टिसाइड बोर्ड में हम भी बैठते हैं तो जब इन बातों पर चर्चा होती है तो फीडबैक दिया जाता होगा। लेकिन इन सबमें ऐसा है कि ओवर ए सर्टेन डोज, अगर डोज से ज्यादा एक्सपोजर हो जाए, तब उसके हार्मफुल इफैक्ट्स हो जाते हैं, क्योंकि सभी कैमिकल्स हार्मफुल हैं। इसलिए उन्हें बैन करने के लिए जैसे इंडो-सल्फान और डीडीटी में हुआ था, जब बड़े ओबवियस हैल्थ इफैक्ट्स हैं तो वह बैन तक पहुंच ही जाती है, लेकिन बाकी जो अभी यूज हो रही हैं, ये सब ग्रेडिड लैवल्स पर आप देखें।..

Integrated Pest Management

4.37 Integrated Pest Management has been the policy of the Government to stimulate judicious and need-based use of chemical pesticides as well as those of biological origin such as botanical pesticides (neem-based and plant origin pesticide formulations, microbial preparations such as those from antagonistic fungi – *Trichoderma* spp., bacterial formulations such as that of *Bacillus thuringiensis* (Bt.). The tool box of IPM lays emphasis on pest management through a combination of agronomic, chemical and biological methods. Timely sowing, use of tolerant and resistant plant varieties, transgenic pest resistant crop, biocontrol agents, and need-based application of chemical pesticides are the basic tools of IPM tool box. A number of novel pesticide chemistries that have low impact to agro-ecologies and natural habitats and also requiring small dosage per unit farm land have revolutionized the pesticide application in crops in a large measure. The general trend in the reduction of pesticide use is due to low dosage pesticide chemistries, particularly in the class of herbicides and insecticides that have been now registered for manufacture and use in the country.

4.38 The Department of Agricultural Research and Education have further stated that pesticide contamination and their residues in food commodities and feed have been a major concern in consumers in recent times. While the IPM ensure the safe and judicious use of pesticides in agriculture, the effort to practice Good Agriculture Practice (GAP) with the visualization of higher care to avoid pesticide contamination in food and feed is being propagated to farmers. Used container management,

management of pesticide applicators and making farmers and farm labourers aware of the benefits GAP and other aspects are the ways in which risk due to pesticide contamination in food and feed can be reduced. IPM measures also reduce the pesticide contamination in food due to reduced pesticide use. The data generated over the last four years indicate that on national scale, the contamination varies between 1.7% to 2.2%. Violations under Prevention of Food Adulteration limit of maximum residues in commodities were also quite low. Over sixty thousand samples have been analysed so far under this project. The Plant Protection Division of Department of Agriculture and Co-operation funds this project and ICAR is operating it in 21 laboratories across various government departments. The recent upsurge in sap-sucking pests across crops has increased the insecticide consumption in many crops. Indian agriculture has been challenged due to short-fall of labour force during peak seasonal operations. However, the environmental contamination of chemical pesticides could be reduced by making the farmers and researchers aware, about timely, safe and proper application of pesticides.

4.39 When asked about policy of the Government of India to achieve the objectives of Integrated Pest Management, the Department submitted as under:

"Government of India has adopted IPM as cardinal principle and main plank of plant protection in the overall Crop Production Program since 1985. To achieve the objectives of Integrated Pest Management, the Council provided technical backstopping through National Research Centre for Integrated Pest Management and All India Coordinated Research Project on Biological Control."

4.40 On being asked about efforts being made in the Country to achieve the objective as outlined in Integrated Pest Management, the Department submitted as under:

"NCIPM is validating IPM technology in various crops mainly rice, cotton, pulses, vegetables, fruits crop, oilseed etc. NCIPM have developed location specific forecasting models of some crops in NICRA programme and ICT based e-pest surveillance system. The government is implementing the various scheme namely Strengthening & Modernization of Pest Management Approach in the Country (SMPMA), Strengthening & Modernization of Plant Quarantine Facilities in India (SMPQF) and Monitoring of Pesticide Residues at National Level (MPRNL) to achieve the objective as outlined in Integrated Pest Management. Besides, National Institute of Plant Health Management (NIPHM) assists the States and the Government of India in increasing the efficiency of the existing pest and disease surveillance and control system, certification and accreditation systems through a core role as a training and adaptive research

centre in the field of extension and policy developments related to plant protection. The NIPHM provides its services to organizations in both the public and the private sector."

4.41 On the above issue, the representative of Department of Agriculture, Cooperation and Farmers Welfare stated as under:-

‘...हाँ तक कीटनाशकों का सवाल है, हम सभी जानते हैं कि कीटनाशक जहर है। इसका प्रयोग बहुत ही सोच-समझकर करना चाहिए जितनी मात्रा दिशा-निर्देश में लिखी गयी है, अगर उससे ज्यादा प्रयोग करेंगे या ऐसी फसल पर उपयोग करेंगे जिसके लिए वह है ही नहीं तो उसके नतीजे बहुत खतरनाक होंगे। मैं मानता हूँ कि इसमें हमारी असफलता रही है। कोई कीटनाशक जो किसी एक फसल के लिए तैयार किया गया है, अनुमोदित किया गया है, वह दूसरी फसलों पर भी उपयोग हो रहा है। उसके परिणाम घातक हो सकते हैं। मैं मानता हूँ कि यह हमारी कमी रही है। हम इसका कितना प्रचार-प्रसार कर पाएँ ताकि किसान सही मात्रा में इसका उपयोग करें। मैं एक उदाहरण देता हूँ, पहले जब फ्लिट का जमाना था, हम फ्लिट तब तक करते थे जब तक वह मच्छर मरकर गिर नहीं जाता था क्योंकि हमारे मन में यह धारणा रहती थी कि जब तक हमारे सामने वह कीट मर न जाए तब तक उस कीटनाशक का असर नहीं हुआ है। यह धारणा लोगों में अभी भी है। इसकी वजह से लेबल पर लिखी हुई मात्रा से ज्यादा कीटनाशक का उपयोग होता है। कई बार यह बात दिमाग में नहीं आती है कि जहर को असर करने में टाइम लगता है, इसलिए जरूरत से ज्यादा उसका उपयोग होता है। जब जरूरत से ज्यादा उपयोग होगा तो उसके परिणाम घातक होते हैं। फलों और सब्जियों को पकाने के लिए कॉपर सल्फेट का प्रयोग होता है, लेकिन उसका प्रयोग कम होता है। कॉपर सल्फेट का प्रयोग परवल वगैरह पर चमक लाने के लिए करते हैं। कार्बाइड का प्रयोग घातक है जिससे फलों को पकाया जाता है। कार्बाइड का प्रयोग इललीगल है, यह दवा बैन्ड है। पकाने के लिए केवल एथिलीन का उपयोग किया जा सकता है। यह विषय फूड सेफ्टी का है, यह हेल्थ डिपार्टमेंट के अंतर्गत आता है। लेकिन कार्बाइड बहुत ही घातक चीज है। धीरे-धीरे हमने दो-तीन फलों के मामले में काफी हद तक सफलता प्राप्त की है। कार्बाइड बहुत अर्से से बैन्ड है, लेकिन वस्तुस्थिति से हम सभी अवगत हैं। इसका प्रयोग किसान नहीं करता है, इसका उपयोग व्यापारी करते हैं।...

Allocations for Integrated Pest mangement

4.42 When asked about specific allocations made for for achieving the objectives of IPM, the Department submitted as under:

"ICAR has set up National research centre for integrated pest management for achieving the objectives of IPM and the allocation and expenditure for five years is as follows:-

Year	Allocation	Expenditure (Rs. In lakhs)
2010-11	157.00	157.00
2011-12	150.00	150.00
2012-13	125.00	122.20
2013-14	131.50	131.25
2014-15	128.00	127.86

To enhance the production and productivity of crops by protecting them from the ravages of pests, the Govt. of India. Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Co-Operation & Farmers Welfare launched a scheme "Strengthening and Modernization of Pest Management Approach in India" since 1991-92 by adopting Integrated Pest Management (IPM) as cardinal principle and main plank of plant protection strategy in overall crop production and protection programme. Under the ambit of IPM programme, the Govt. of India established 31 Central IPM Centres (CIPMCs) in 29 States and one UT. In 12th Five year plan EFC Memo, a "National Mission on Agricultural Extension and Technology (NMAET)" was formed under which a sub-mission on "Plant Protection and Plant Quarantine" was introduced from 2014-15. "Strengthening and Modernization of Pest Management Approach in India has become one of the components of this sub-mission with mandate to popularize adoption of Integrated Pest Management (IPM) through training and demonstration in crops *inter-alia* promotion of biological control approaches in crop protection technology.

Though no specific allocations have been made for achieving the objectives of IPM , however budget allocated for the CIPMCs for other activities is used for IPM work also. The following activities are being taken up by CIPMCs to profess the IPM programmes.

1. Conducting Farmers Field Schools.
2. Conducting two days short duration training programmes for the farmers.

3. Conducting five days short duration training programmes to the State extension officers who intern enhance the knowledge in their areas of jurisdiction.

S.no	Year	Allocation for FFS (A)	Expenditure for FFS (E)	A (for 2-dyas)	E (For2-Days)	Grand Total Allocation	Grand Total Expenditure
1.	2011-12	1,94,64,300	1,71,82,543	47,86,400	43,40,856	2,42,50,700	2,15,23,399
2.	2012-13	1,77,82,200	1,50,80,686	50,18,000	41,62,298	2,28,00,200	1,92,42,984
3.	2013-14	1,92,27,900	1,49,42,568	44,00,400	41,17,089	2,36,28,300	1,90,59,657
4.	2014-15	96,12,000	1,20,49,824	22,00,200	18,03,088	1,18,12,200	1,38,52,912
5.	2015-16	1,00,12,500	Awaited (@)	46,70,600	Awaited (@)	1,46,83,100	

@ IPM- Programmes for 2015-16 still going on , expenditure for them is awaited

Training Programmes on Integrated Pest Management

4.43 When asked about workshops and training programmes have been organized by ICAR Institutes on Integrated Pest Management in the Country during the last five years, the Department submitted that a total 15 Training Programmes have been conducted, which are as follows:

Trainings conducted by DPPQS, Faridabad

- Master Trainer's Training courses (Seasons Long Trainings) conducted on Various Agricultural/Horticultural crops 48 Nos
- Master Trainers Trained through SLTs 1697 Nos
- Farmers' Field Schools organized 12931 Nos by CIPMCs/KVKs/SAUs
- Agriculture/Horticulture Extension Officers Trained through FFSs 54369 Nos
- Farmers trained through FFSs 3,88,863 Nos
- Persons (Pesticide dealers, NGOs, lead farmers, private entrepreneurs etc.) trained under Human resource Developments Programmes (2&5 daysduration) on IPM skills 13730

NCIPM had organized the following IPM training Prgomme:

- Year : 2013, Venue: Nagaland for Nagaland, Manipur and Arunachal Pradesh
- Year: 2013, Venue: Meghalaya, for Meghalaya, Assam, Sikkim
- Year 2013(2 Trainings): Tripura, Tripura
- Year 2014: Venue: Bangalore, For Karnataka, Goa, Tamil nadu and Kerala
- Year 2014: Venue: Pondicherry , for Karnataka, Goa, Tamil nadu and Kerala
- Year 2014: Venue, Kanpur for Utter Pradesh, Uttra khand
- Year 2014: Venue: Modipuram for Utter Pradesh, Uttra khand
- Year: 2014: Venue: Delhi, for Bihar
- Year 2014: Venue: Jaipur, For Rajasthan and Gujarat
- Year 2015(2): Venue Delhi for Delhi, Utter Pradesh, Haryana, Assam, West Bengal, Orissa, Nagaland, Manipur, Punjab, Jammu and Kashmir
- Year 2015. Venue: Jabalpur for Madhya Pradesh, Chhattisgarh, Orissa and Bihar
- Year 2015: Venue: Kalyani for West Bengal, Bihar, Orissa, Jharkhand, Andaman and Nicobar
- Year 2015 Venue: Ludhiana for Punjab, Haryana, Delhi, Himachal Pradesh ,Jammu and Kashmir

4.44 On the query of the Committeee regarding cases of sale of banned, spurious and expired pesticides pending before the Department of Agriculture and Cooperation Department of Agriculture, Cooperation and Farmers Welfare submitted that a details regarding the number of cases of sale of banned, spurious and expired pesticides and action taken by Department of Agriculture & Cooperation are at **Annexure X**.

4.45 On the query of the Committee regarding development of technologies, alternative green pesticides etc. for achieving the objectives of IPM by ICAR Institutes during the last five years, the Department furnished the following details:-

1. "IPM technologies for cotton as well as pulses (Pigeonpea and chickpea), wherein toxic pesticides have been replaced with alternative pesticides based on green molecules. These technologies have not only helped in reducing number of sprays but also helped in limiting use of Organophosphates as well as carbamates.
2. Cultural strategies for Zonal (North, Central & South) and national level mealy bug (*Phenacoccus solenopsis*) management

3. Web enabled -Weather based forewarning for insect pests viz.,
4. Sap feeders of cotton (jassids, thrips and whiteflies) for 5 locations [Nagpur (MH), Faridkot (PB), Hisar (HR), Ludhiana(PB) and Sriganaganagar (RJ)]
5. Rice yellow stem borer for five locations Aduthurai (TN), Chinsura (WB), Karjat (MH), Mandya (KA), Raipur (CG)] during *Kharif*
6. Rice leaf folder for Kharif season of Ludhiana (PB) and Aduthurai (TN) and for Rabi season of Aduthurai (TN)
7. Forewarning pod borer (*Helicoverpa armigera*) of pigeonpea at Gulbarga (KA)
8. Forewarning of tobacco caterpillar *Spodoptera litura* on groundnut for three locations [(Kadiri (AP), Dharwad (KA) and Junagadh (GJ)]
9. 8. Web enabled pest surveillance across crops (Rice, Pigeonpea, Groundnut and Tomato) and locations (25 nos covering 10 states, across 10 agro-climatic zones & 12 agro ecological regions).
10. ICT for area wide implementation of IPM across Kharif (rice, soybean, cotton and pigeonpea) and *Rabi* (chickpea) crops in Maharashtra

Light trap for managing insects leading to reduction in use of pesticides"

4.46 When asked about efforts are being made by the Department to encourage research and development of developing plant/seed varieties which can have inherent capacity to withstand pest and other harmful plant diseases, the Department submitted as under:

"Crop based research institutes with ICAR develop pest resistant/ tolerant varieties providing crops inherent capacity to withstand the attack of diseases and pests."

4.47 On the query of the Committee regarding inventory of good farming practices promoting minimum use of pesticides in the Country made by the ICAR, the Department submitted the following details:-

1. "NCIPM has developed location specific various IPM technologies in different crops viz. rice, cotton. Vegetables (Okra, bell pepper chilli, bitter gourd, onion), fruit crops, protected cultivation in which the use of pesticides is minimized.
2. ICT based e-pest surveillance programme
3. Light trap for managing insects"

Use of Protective Gears by the Farmers during Sprinkling of Pesticides in Fields

4.48 On the query of the Committee regarding use of protective gears by the farmers during sprinkling of pesticides in fields and the information/training provided to the farmers to make them aware of ill-effects of pesticides on health of farmers, the Department submitted as under:

"Farmers often refrain from using protective gears that are advocated while sprinkling the pesticides in fields. Regular trainings on precautions taken during spray of pesticides is being given by NCIPM and DPPQS. Through these training programs farmers are made aware of ill effects of pesticides on health."

PART-II
OBSERVATIONS/RECOMMENDATIONS OF THE COMMITTEE

Use of Chemical fertilizers and Pesticides

1. The Committee note that Green Revolution has been a boon to solve crisis of food grains which our country was facing at the time of independence. Strategy of *high yielding seeds-fertilizer-irrigation* has paid rich dividend and farmers of our country were able to enhance food grain production from 83 mt in 1960-61 to around 253 mt in 2014-15. Now, our country is not only sufficient in production of food grain to meet food requirements of the country but also able to contribute towards foreign earning. However, the Committee observe that this achievement in the field of agriculture has also affected the environment and brought many negative impacts associated with use of chemical fertilizers and pesticides on agriculture and allied sectors in the country. The Committee are of the view that there is need to examine pros and cons of strategy of use of chemical fertilizers and pesticides to enhance food production in order to incorporate suitable changes to conserve our natural resources and minimize adverse effects on agriculture & allied sectors without jeopardizing agricultural growth. The Committee have analyzed different aspects associated with the issue in succeeding paragraphs.

Decline in Agricultural Growth

2. The Committee note that the country will require to enhance the food grains production to the level of 300 mt by 2025 to feed its teeming millions.

However, the Committee are distressed to note that the pace of agricultural growth rate is slowly decreasing. The Committee observe that decadal rate of growth of agriculture since beginning of green revolution has decreased significantly from a high of 8.37% during 1960-70 to a low of 1.44% during 1990-2000. The rate of agriculture growth has been 2.61% during 2000-2010. The Committee further observe that rate of agriculture growth in important States like Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Gujarat, Bihar and Maharashtra has decreased significantly during the last decade. The Committee also note that country failed to achieve the agriculture growth rate of 4% which was set during 12th plan. The Committee are of the view that strategy of over-reliance on chemical fertilizers adopted during green revolution period needs reorientation keeping in view of stagnant agricultural growth in important States. The Committee, therefore, recommend the Department to analyze the strategy of agricultural growth in country and prepare a detailed plan to reinvigorate the sector in the country.

Degradation and Erosion of Soil Fertility

3. Plants require nutrients for their growth. These nutrients such as nitrogen, phosphorus, potassium, calcium, magnesium, sulphur copper, iron etc. are derived by plants from soil. Traditionally, farmers used farm yard manure or animal manure to augment declining soil productivity. However, strategy of green revolution involved use of non-renewable inputs of phosphorus potash and nitrates as chemical fertilizers to meet nutrient deficit of soil. Application or use of chemical fertilizers in agriculture should be based upon scientific

assessment of soil nutrient status. However, the Committee note that use of fertilizers in India was hardly based upon scientific analysis of soil due to near absence of soil testing facilities, low awareness and over reliance on Urea due to fertilizer subsidy policy. Imbalanced and inadequate nutrient use coupled with neglect of organic manure has caused multinutrient deficiency in Indian soil. The Committee note that out of total 525 Districts in the country, about 292 Districts account for 85 percentage of total fertilizer consumption. The Committee have further been informed that nutrient deficiency in country level are of the order of 89, 80, 50, 41, 49, 33, 13, 12, 5 and 3% for nitrogen, phosphorus, potassium, sulphur, zinc, boron, molybdenum, iron, manganese and copper respectively. The continuous use of high analysis fertilizer has made sulphur a limiting nutrient in many soils in the country. The limiting nutrients do not allow the full expression of other nutrients, thereby, lowering the fertilizer response and crop productivity. The Committee have also been informed that Indian agriculture is operating with a negative balance of plant nutrient in soil. The fertility status of Indian soils has been declining fast under intensive agriculture as nutrient application is not able to keep pace with their removal by crops and soil are showing signs of fatigue especially in Indo Gangetic plain. The inadequate and imbalanced nutrient use coupled with neglect of organic manure has caused multi nutrient deficiency in soil in many areas over the years. The Committee note that many study on impact of green revolution in India has found that excessive use of fertilizers and pesticides had led to degradation and erosion of soil fertility, built up of toxic nutrients in

soil, loss of micronutrient, loss of soil microorganisms among other desirable and undesirable effects. The micro nutrient deficiency in Indian soil due to excessive use of nitrogen fertilizers and inadequate use of micronutrient fertilizer has its impact on nutritional status of crop grown in it which are devoid of essential micronutrient necessary for human health. The studies have shown that micronutrient deficiency in crop is causing deficiency of micronutrient such as zinc, iron, copper etc. among Indian population leading to many diseases and growth impairment in human and animals. Use of nitrogenous fertilizers in agriculture is also causing eutrophication of water bodies causing deterioration of water quality. The Committee also note that fertilizer being used in agriculture is also source of Nitrous oxide which is a potent green house gas. However, the Committee are perturbed to note that the Government has not bothered to conduct any comprehensive study/analysis on adverse impact of use of fertilizers and pesticides on soil fertility including on surrounding environment and health of the masses. The Committee, therefore, recommend that a comprehensive study on impact of chemical fertilizers and pesticides on agriculture and allied sectors in the country may be undertaken by the Government so that curative steps may be planned to address its negative impact and fresh strategy may be formulated for rapid agriculture growth in the country.

Balanced Use of Fertilizers

4. The Committee note that chemical fertilizers have played an important role in increasing food grain production in country. Use of chemical fertilizers is

one of the costliest inputs which has become a necessity in Indian agriculture Sector without which it would be difficult to feed ever increasing population of the Country. The use of chemical fertilizer in the country have increased from less than 1 million tons of total nutrients in mid sixties to 25.6 millions tonnes in 2014-15. The country will require around 45 MT of nutrients to achieve the food grain production of 300 MT by 2025 to feed its increasing population. However, majority of 45 MT nutrients has to be supplied through chemical fertilizers as only 6-8 MT nutrients can be supplied through existing organic sources. The Committee also note that the pattern of use of fertilizer in the country is not even. About 292 districts accounts for consumption of 85 percentage of fertilizer in the country. Further, there's imbalance in fertilizer use in terms of NPK as it is evidenced by their wider consumption ratio of 6.7:2.4:1 in the country as against their desirable ratio of 4:2:1. The situation is more grim in agriculturally important States like Punjab and Haryana where NPK use ratio is as high as 31.4:8.0:1 and 27.7: 6.1:1 respectively. According to the Secretary of Department of Agriculture, Cooperation and Farmers Welfare, skewed subsidy policy in favour of urea and high prices of other fertilizers are the real culprit behind the imbalanced use of fertilizers in the country. Even the pattern of use of fertilizer varies widely among different crops. Fertilizer use in potato, sugarcane, cotton, wheat and paddy are among highest at the level of 347.2, 239.3, 192.6, 176.7 and 165.2 kg/hectare respectively. Even among these crops, there is excessive use of nitrogenous fertilizer. The Committee also observe that there's

excessive use of urea in country. During 2014-15, 306 million tonnes Urea was used out of total 485 million tonnes fertilizer consumption in country. The Committee are of the view that there is an urgent need to take steps to rationalise over usage of chemical fertilizers in country in order to restore fertility of soil and to check negative effects associated with it. The Committee, therefore, recommend that a strategy may be worked out to promote the balanced use of fertilizers in the Country. It is also imperative that the farmers are educated on this aspect and therefore, the Committee also recommend that a massive awareness campaign may be launched by the Government to educate farmers regarding balanced and judicious use of fertilizers in the Country.

Integrated Nutrient Management

5. The Committee note that Integrated Nutrient Management (INM) adopted from Tenth plan envisages conjunctive use of chemical fertilizers including secondary and micronutrient, organic manure, composts/vermin-compost, bio-fertilizers and green manures. ICAR has generated GIS based soil fertility maps, nutrient management packages, developed strains of Nitrogen fixer for production of quality biofertilizers, standardized technologies for preparation of urban/rural compost, green manuring and crop residue recycling which can be effectively utilized by the farmers of the country to improve soil health and augment agricultural production and productivity. ICAR has also

developed conservation technologies like fertigation, zero tillage, bed planting, laser land levelling and leaf colour chart to save costly fertilizers. According to ICAR, workshops and training programs are being organized to educate farmers on these aspects. However, the Committee are concerned to note that objectives as outlined in Integrated Nutrient Management could not be achieved by the Government which is amply exemplified by imbalanced use of fertilizers in terms of NPK, incidents of soil degradation in green revolution area like Haryana and Punjab and extreme lack of micronutrient in majority of Indian soils. The Committee also note that lack of effective extension services to the farmers as brought out in previous reports of the Committee is a limiting factor to achieve the aims of Integrated Nutrient Management. The Committee are of the view that unless a robust agriculture extension system is established in the country with special emphasis on training of farmers about good agricultural practices, provision of essential agricultural inputs and dissemination of technologies, bio-fertilizers etc. developed by agricultural institutions, it would be difficult to secure our environment without jeopardizing agricultural productivity. The Committee, therefore, recommend the Government to plan an effective agricultural extension services in the entire country. The Committee also desire that the Government may initiate discussion on the issue with all State Governments, agricultural research institutions, NGOs active in the field of agriculture and experts at National and International level so that steps may be taken to achieve the objective of Integrated Nutrient Management well before

environmental degradation reached at a point of no return.

Fertilizer Subsidy Policy

6. The Committee note that the Government has been regulating sale, pricing and quality of fertilizers in the country to ensure adequate and timely availability of fertilizers at affordable price to farmers for maximizing agricultural production in the country and to ensure food security for the people. The difference in concession rate/import price and net market realization is given as subsidy by the Government to the farmers through fertilizer industry. The subsidy regime started in the country during 1977 as Retention Price Scheme. Subsequently, Concession Scheme for P&K Fertilizers was introduced w.e.f. 01 April, 2008. Under the Concession Scheme, MRP of P&K fertilizer was fixed by the Government and the difference in the delivered price of fertilizers at the farm gate and MRP was compensated by the Government as subsidy to the Manufacturing Industries. This scheme was continued upto 31.03.2010. However, to overcome the deficiency of Concession Scheme, the Government introduced Nutrient based Subsidy (NBS) policy for N,P&K fertilizers w.e.f 01.04.2010. The Committee note that under NBS policy a fixed subsidy, decided annually, is provided on each subsidized P&K fertilizers depending upon its nutrient content such as N, P, K and Sulphur. Under NBS, additional subsidy is provided for fertilizers fortified with Zinc and Boron. Single Super Phosphate (SSP) has also been included under scheme. NBS policy was expected to promote innovation and broaden the basket of fertilizers and enable fertilizer use as per soil and crop

requirements. However, exclusion of Urea from NBS and decontrol of price of P & K fertilizers has led to imbalanced application of nitrogen vis-a-vis phosphatic and potassic fertilizers in country. These facts have been accepted by the representatives of the Department of Fertilizer during the evidence. The Committee have also observed that present policy of fertilizer subsidy also exclude liquid fertilizers, bio-fertilizers, farm organic manure etc. which are considered more effective and environment friendly to restore soil fertility and enhancement of agricultural productivity. It has also been argued by the Department Agriculture, Cooperation & Farmers Welfare that usage of fertilizers should be left to the discretion of the farmers by direct transfer of fertilizer subsidy to the farmers. The representative of Department of fertilizer had also suggested to provide fertilizers to the farmers as per soil health card. The Committee are of view that the present NBS policy has failed to rationalize fertilizer subsidy and has led to imbalanced use of fertilizers due to high prices of Phosphatic and Potassic fertilizers and low price of Urea. While appreciating the recent reduction in the prices of phosphatic and potassic fertilizers by the Central Government, the Committee are of the view that there is a need of fertilizer subsidy regime which can promote environment friendly fertilizers like bio-fertilizers, organic farm manure or liquid fertilizer which are more effective than granules. The Committee, therefore, recommend that existing fertilizer subsidy policy may be revised and the revised policy which is more appropriate for Indian conditions and favour sustainable growth of agriculture sector may be formulated. Further, there is a need to encourage

the organic farming considering its long term benefits. The ways of encouraging the organic farming should also be explored while revising the existing Fertilizer Subsidy Policy.

Constitution of Regulatory Authority for Fertilizer Sector

7. Availability of good quality fertilizers is one of the major responsibility of Central and State Governments by which they can help the farmers of the country to enhance their production and income. However, sometimes production and sale of inferior quality of fertilizers in the market badly affect agricultural production, which in turn affect already burdened farmers. Therefore, robust registration process of fertilizers and regular check are ways to ensure that only qualitative fertilizers are produced and sold in the market. The Committee note that Central Government has constituted a Central Fertilizer Committee (CFC) under Fertilizer Control Order (FCO), 1957 for analysis and recommendation of new fertilizer for inclusion in the FCO. CFC constituted a technical group consisting of a Chairman from ICAR and other members/scientists/experts from the field of agriculture. The Committee also note that before inclusion of any new fertilizer in the FCO, this technical group examines the agronomic aspects, specifications and field trials reports of new fertilizer. Agronomic field trials are required to be conducted by the Company in minimum two cropping seasons under the aegis of a State Agricultural University or any other Institutes of ICAR. Recommendation for inclusion of new fertilizer in FCO is done by CFC only on the basis of further examination of technical group report/recommendations.

The Committee are of the view that present system of certification of new fertilizer is cumbersome, time consuming and bureaucratic. Further, field trials of new fertilizer without involvement of technical group or CFC leaves scope for manipulation of results of field trials. Thus, there is a need to streamline the existing process and constitution of a Fertilizer Development and Regulating Authority will help to streamline the process, certification of fertilizers, continuous quality check, imposing penalty for sub standard and spurious quality of fertilizers, promoting innovations in fertilizer sector and fixation of pricing of fertilizers etc. The Committee, therefore, recommend the Government to take required steps for Constitution of a regulatory authority for fertilizer sector.

Incentives for usage of Bio-Fertilizers

8. The Committee note that bio-fertilizers do not contain any chemicals which are harmful to the living soil and are extremely advantageous in enriching soil fertility. Bio-fertilizers such as Rhizobium, Azotobactor, Blue Green Algae etc. are eco friendly organic agro inputs. Bio-fertilizers fulfill plant requirements by supplying organic nutrients through microorganism and their byproducts. During 2014-15, 80696.45 MT carrier based and 4054.56 KL liquid based bio-fertilizers were used in the Country. The Committee also observe that use of bio-fertilizers is more in western and southern parts of country, whereas, eastern and northern States are lagging behind in use of bio-fertilizers. The Government is providing financial assistance @ 25% of total financial outlays

subject to ceiling of Rs. 40 lakhs to individuals and private agencies for bio-fertilizers units. Financial assistance is also being provided to the State Governments/Government agencies to set up input production unit and bio-fertilizer/bio pesticide units and bio-fertilizer and organic fertilizer quality control laboratories under Pradhan Mantri Krishi Vikash Yojna and National Mission for Sustainable Agriculture. The Committee note that 50 bio-fertilizer units have been established under the scheme with production capacity of 12563 tons as on March, 2014. However, the Committee are distressed to note that there is no provision to provide any kind of direct incentives/ subsidy on bio-fertilizers to the farmers to promote its widespread use in country. The Committee are of considered view that there is an urgent need to devise policy to promote use of green alternatives such as bio-fertilizers in order to minimize harmful impact of chemical fertilizers on environment and human health. The Committee, therefore, recommend that the Government may explore possibilities to provide direct incentives to the farmers for use of bio-fertilizers across the country. The Committee also desire that a strategy may be worked out to encourage entrepreneurs for establishment of units for production of bio-fertilizers in States in northern, eastern and North-eastern parts of the country. The Committee would like to be apprised of the initiatives undertaken by the Government.

Promotion of Organic Farming

9. The Committee note that 7.23 lakh hectare land in the country, excluding the wild harvest, is certified area under organic farming. The Committee also note that there exist a large export market for organic food products in international market and if given proper guidance and incentives, the farmers are well placed to exploit the opportunity and help the country to earn foreign exchange. APEDA under the Department of Commerce functions as the Secretariat to the National Programme on Organic Production (NPOP), which defines the regulatory mechanism for export of organic produce. NPOP has earned equivalence with European Union and Switzerland and now any produce certified by Indian agencies can be exported to these countries without the requirement of recertification. The Government is providing financial assistance to private agencies/individuals along with State Governments/Government agencies for setting up of bio-fertilizer production units. The Government has also launch Paramparagat Krishi Vikash Yojana (PKVY) under National Mission on Sustainable Agriculture (NMSA) through which assistance is being provided for organic farming. Under PKVY, the Government plans to develop 10000 cluster with a cluster size of 50 acres so as to increase certified area by 5 lakh hectares in next 3 years and to develop potential market for organic products. The Committee are of considered view that promotion of organic farming is urgently required to safeguard surrounding environment and health of human beings and animals from usage of chemical fertilizers and pesticides. For this, it is imperative that the farmers of the country are given direct financial support along with technical

expertise and supervision to switch to organic farming on a large scale. The Committee, therefore, recommend that the Government should make concerted and coordinated efforts in coordination with State Governments and other Stake holders to augment coverage area and production of organic farming in the country and for this purpose they may be provided suitable incentive in terms of financial assistance and technical expertise. Further, the Committee also desire that extension services may also be strengthened in order to provide guidance/assistance to the farmers during transition phase to organic farming.

Effects of Excessive/Unscientific use of Pesticides

10. The Committee note that the chemical fertilizers and Pesticides changed the face of agriculture in country by enhancing agricultural production and productivity and making India self reliant in food grains. Usage of pesticides has been an integral part of green revolution strategy which not only enhanced food grain production by reducing losses from weeds, diseases and insects/pests but also helped in improving quality of crops/vegetables/fruits. However, the Committee also note that pesticides have several drawbacks such as potential toxicity to human and other species.

Excessive/unscientific use of pesticides has caused tremendous harm to the environment as well as affected human population indirectly. Pesticides causes various deteriorating health hazards in animals as well as human

beings. Pesticides such as organochlorine, pyrethroids can cause cancer along with other neurological and endocrine system disorders. According to Stockholm convention on Persistent organic pollutants, 9 out of 12 most dangerous and persistent organic chemicals are organo-chlorine pesticides. The Committee also note the havoc caused to the local population due to unscientific use of endosulphan in Kerala. Increasing incidents of cancer are being reported among local population in Punjab where pesticides use in agriculture is among the highest in the country. The Committee also note about report of Centre for Science and Environment in Punjab wherein, they established presence of multiple pesticides in blood samples of residents in 4 villages in Bhatinda and Ropar districts. However, according to the Department of Health Research, the study didn't attempt to correlate the presence of pesticides to any observed health effects. The Committee also take note of studies by Department of Health Research wherein, effects of pesticides are being analyzed among exposed population in the country. However, lack of funds is one of the constraints to take up a comprehensive research on impact of pesticides and fertilizers on human health.

The Committee note that 25 institutions in Country are monitoring pesticides level in food samples across the country under 'Monitoring of Pesticides Residues at National level (MPRNL)' programme of Ministry of Agriculture wherein, samples of vegetables, fruits, pulses, spices, wheat, rice, fish etc. are collected and analysed for possible presence of pesticides level. The Committee also note that FSSAI have set standards for maximum

pesticides residues in food products and department of DAC & FW, FSSAI and State Governments are responsible for ensuring compliance to these standards. The Committee note with concern that unscientific and excessive use of pesticides in agriculture and other sectors in the country pose a real threat to the environment and the health of human population as well. Since pesticides are mostly non biodegradable and persist in environment, there is possibility of entry of pesticides in to human blood through the process of bio-magnification through food chain. The Committee are therefore of the view that there is an imperative need for promoting scientific use of pesticides in agriculture sector in our country. The Committee, therefore, recommend that rigorous efforts in coordination with all concerned may be made to create awareness amongst farmers for scientific use of pesticides for increasing production and productivity of their food grains. All State Governments may also be impressed upon to strictly monitor pesticides level in food samples as per the Standards set up by FSSAI on regular basis. The Committee also recommend that the Government should also impress upon the Ministry of Finance to provide adequate funds to the Department of Health Research for undertaking comprehensive research on impact of pesticides on human health. The Committee would like to be apprised of the initiatives undertaken by the Department in this regard.

Integrated Pest Management

11. The Committee note that the Government has adopted Integrated Pest Management (IPM) as cardinal principle and main plan of plant protection in the overall crop production programme since 1985. IPM lays emphasis on pest Management through a combination of agronomic, chemical and biological methods. IPM ensure the safe and judicious use of pesticides in agriculture. Timely sowing, use of tolerant and resistant plant varieties, transgenic pest resistant crops, bio-control agents and need based application of chemical pesticides are basic tools of IPM tool box. The Committee also note that Government is implementing various schemes namely Strengthening & Modernization of Pest Management Approach in the country (SMPMA), Strengthening & Modernization of Plant Quarantine Facilities in India (SMPQF) and Monitoring of Pesticides Residues at National Level (MPRNL) to achieve objectives outlined in IPM. The Committee have also been informed that National Research Centre for Integrated Pest Management (NRCIPM) is validating IPM technologies in various crops and developed location specific forecasting models of some crops under NICRA project and ICT based e-pest surveillance system. Besides, National Institute of Plant Health Management (NIPHM) assists the States and Government of India in increasing the efficiency of the existing pest and disease surveillance and control system, certification and accreditation system through a core role as a training and adaptive research centre in the field of extension and policy development related to plant protection. The Government of India has established 31 Central IPM Centres (CPIMCs) in 29 States and 1 UT. These CIPMCs do take

activities like training for farmers, training for State extension officials, conducting farmers field schools etc. However, the Committee are distressed to note that no specific allocations have been made for achieving the objectives of IPM and budget allocated for Central IPM centres is used for IPM work. The Committee, therefore, recommend that adequate funds may be allocated for IPM for achieving its objectives without any financial constraints. The Committee would like the Department to impress upon the Ministry of Finance for the purpose.

Regulation of import and use of Pesticides

12. The Committee note that 57353 MT (technical grade) pesticides were used in country during 2014-15 (provisional). However, the Committee also observe that use of pesticides in the country is not even in different States. There is widespread use of pesticides in States like Uttar Pradesh, Maharashtra, Punjab, Haryana, Andhra Pradesh and West Bengal which were pioneer States during green revolution. Further, the Committee also observe that 77376 MT (technical grade) pesticides worth Rs.5122.09 crore were imported in country during 2013-14. The Committee are also perturbed to note that there is variation in use of pesticides in the country and import figures and the Department of Chemical and Petrochemical have received complaints about the same by local manufacturers that multinationals companies are importing formulation rather than chemical grade and pushing these in local markets.

The Committee also note that DDT is still being used in agriculture in some States despite its ban in the Country. This only goes to show that there is no effective regulatory mechanism to ensure manufacturing, import and sale of pesticides in country in terms of the provisions of Insecticides Act, 1968. The Committee, therefore, recommend that the existing regulatory mechanism may be strengthened in consultation with State Governments concerned to check the acts which are contrary to the provisions of Insecticides Act, 1968. The Committee also recommend that an enquiry may also be conducted to find out inconsistency between import and use of pesticides in the country along with diversion of DDT for agriculture use and legal action may be taken against companies which are indulged in such illegal acts.

Scientific Use of Pesticides

13. The Committee are concerned to note that problems associated with unscientific and excessive use of pesticides have not been addressed properly by the Government of India and State Governments which is evident by rising cases of occupational exposure and associated diseases such as cancer among local farmers in Punjab and other places in the country. Besides creating awareness and training of farmers for scientific use of pesticides in agriculture, the Committee feel the need of distribution of protective gears and pesticide sprinklers to the farmers to prevent them from unwanted exposure of pesticides. The Committee are of considered view that it is imperative that the use of pesticides in agriculture and other sectors is supervised scientifically. The Committee are also of the view that economic

gains should not be achieved at the cost of public health and the environment. The Committee, therefore, recommend that a comprehensive action plan may be prepared by the Government ensuring environment sustainable manufacturing, import, sale and use of pesticides in agriculture as well as other sectors including availability of safety gears to farmers and workers. The Committee desire the Government to prepare action plan in consultation with all stakeholders such as State governments, Agricultural Universities/Institutions, Chemical Pesticides Manufactures/Importers, Traders, Farmers along with Experts/NGOs active in the field of agricultural management. The Committee also desire the Government to allocate specific funds for implementation of action plan for the purpose. The Committee would like to be apprised of the steps taken by the Government in this regard. The Committee also desired the Government to explore options to provide license for sale of pesticides to the persons holding degree/diploma/certificates in Agriculture Sciences.

Constitution of Pesticides Development and Regulation Authority

14. The Committee note that Insecticides Acts,1968 and Insecticides rules, 1971 framed there under regulate import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animals, and matter connected therewith. Central Insecticide Board is constituted under the Act to advise the Central and State Governments on

technical matters arising out of administration of this Act and to carry out other functions assigned to the Board by or under this Act. The Committee also note that Registration Committee constituted under the Act is assigned responsibility for registration of pesticides after scrutinizing formula, verifying claims of efficacy and safety to human beings and animals, specifying the precautions against poisoning and any other functions. Registration Committee are empowered to refuse registration of any pesticides if issues pertaining to safety have not been satisfactorily adhered to. The Central Insecticide Board is empowered to ban manufacturing, import or sale of pesticides if concerns are raised about danger to public health and safety or any adverse report are received about toxic effect of any pesticides. However, the Committee are perturbed to note that there is no provision for periodic scientific evaluation of pesticides used in the country and Central Insecticide Board doesn't carry out any research/study on its own and its advice to Government is based on national and international literature/ information available. Further, action for ban of particular pesticides is taken only after receipt of general information on ban or restriction of particular pesticides in other countries. Ban on pesticides is based on the recommendation of the Expert Committee constituted for the purpose. The Committee are of view that present system of registration of pesticides is not robust and hardly take care of manipulation of systemic deficiency. Further, absence of ongoing mechanism for periodic evaluation of efficacy and toxicity of pesticides is posing danger to environment in general and public health in

particular. The Committee are of view that there is need to streamline the regulatory mechanism for manufacturing, import and sale of pesticides in the country. The Committee, therefore, recommend the Government to take steps for constitution of Pesticides Development and Regulation Authority after Parliamentary approval for regulation of pesticide sector in the country. The Committee desire the Government to start discussion with all stakeholders for Constitution of such authority in a time bound manner.

Insecticides Act, 1968

15. The Committee were briefed by the Department of Chemical and Petrochemical that while production of pesticides lies with them, the usage of pesticides is administered by the Ministry of Agriculture. So there is conflict of interest, in the admissibility of the provisions of the Act of 1968. It was argued that as the Department of Chemical and Petrochemicals is responsible for production of pesticides in the country, administration of Insecticide Act should naturally be done by them. The Committee are of view that there is an urgent need for review of Insecticide Act, 1968 as the sector needs better regulatory framework in order to safeguard environment and public health. There is also a need for enhanced supervision and coordination between Central and State Governments for regulation of pesticides sector at ground level. The Committee, therefore recommend the Government to take steps for revision of Insecticides Act, 1968 in consultation with all stakeholders including farmers organizations, experts and NGOs/research institutions

active in agricultural field. The Committee also desire the Government to submit a report in this regard at the action taken stage.

NEW DELHI;
08 August, 2016
17 Shravana, 1938 (Saka)

HUKM DEO NARAYAN YADAV
Chairperson,
Standing Committee on Agriculture

ANNEXURES

I TO X

WILL BE

UPLOADED

LATER

APPENDICES

I to IV

WILL BE

UPLOADED

LATER

STANDING COMMITTEE ON AGRICULTURE
(2015-16)

MINUTES OF THE TWENTY NINTH SITTING OF THE COMMITTEE

The Committee sat on Monday, the 08th August, 2016 from 1000 hrs. to 1100 hrs. in Room No. '138', Chairperson's Chamber, Parliament House, New Delhi.

PRESENT

Shri Hukm Deo Narayan Yadav – Chairperson

MEMBERS

LOK SABHA

2. Shri Sanganna Karadi
3. Shri Nalin Kumar Kateel
4. Smt. Raksha Nikhil Khadse
5. Shri C. Mahendran
6. Shri Janardan Mishra
7. Shri Ajay Nishad
8. Shri Mukesh Rajput
9. Shri Konakalla Narayana Rao
10. Shri Satyapal Singh (Sambhal)
11. Shri Virendra Singh

RAJYA SABHA

12. Shrimati Renuka Chowdhury
13. Shri Janardan Dwivedi
14. Shri Meghraj Jain
15. Shri Mohd. Ali Khan
16. Shri Ram Nath Thakur
17. Shri Shankarbhai N. Vegad

SECRETARIAT

1.	Shri U.B.S. Negi	–	Joint Secretary
2.	Shri Arun K. Kaushik	–	Director
3.	Smt. Juby Amar	–	Additional Director
4.	Shri C. Vanlalruata	–	Deputy Secretary
5.	Shri Sumesh Kumar	–	Under Secretary

2. At the outset the Chairperson welcomed the members to the Sitting of the Committee.

The Committee, then, took up the following draft Reports for consideration:-

*(i) XXXX XXXX XXXX XXXX XXXX XXXX;

*(ii) XXXX XXXX XXXX XXXX XXXX XXXX;

(iii) Twenty Ninth Report on the Subject "Impact of Chemical Fertilisers and Pesticides on Agriculture and Allied Sectors in the Country" of the Ministry of Agriculture and Farmers Welfare (Department of Agricultural Research and Education);

*(iv) XXXX XXXX XXXX XXXX XXXX XXXX;

3. After some deliberations, the Committee adopted the draft Reports without any modification and authorized the Chairperson to finalise the Reports on the basis of factual verification from the concerned Ministry/ Department and present the same to Parliament.

The Committee then adjourned.

***Matter not related to this Report.**