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**COMMITTEE ON AGRICULTURE  
(2012-2013)**

**FIFTEENTH LOK SABHA**

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

**“DEVELOPMENT OF ABIOTIC STRESS RESISTANT CROP VARIETIES AND  
DISSEMINATION OF PRODUCTION ENHANCING TECHNOLOGIES – REVIEW OF  
R&D AND EXTENSION EFFORTS IN THE COUNTRY”**

**{Action Taken by the Government on the Observations/  
Recommendations contained in the Twenty-sixth Report  
of the Committee on Agriculture (2010-2011)}**

**FIFTIETH REPORT**



**LOK SABHA SECRETARIAT  
NEW DELHI**

August, 2013/Bhadrapada, 1935 (Saka)

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Presented to Lok Sabha on 30.08.2013

Laid on the Table of Rajya Sabha on 30.08.2013



**LOK SABHA SECRETARIAT  
NEW DELHI**

August, 2013/Bhadrapada, 1935 (Saka)

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## COMPOSITION OF THE COMMITTEE ON AGRICULTURE (2012-13)

Shri Basudeb Acharia - Chairman

### MEMBERS

#### LOK SABHA

2. Shri Narayansingh Amlabe
3. Shri Sanjay Singh Chauhan
4. Shri H.D. Devegowda
5. Smt. Ashwamedh Devi
6. Shri L. Raja Gopal
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11. Dr. (Smt.) Botcha Jhansi Lakshmi
12. Sardar Sukhdev Singh Libra
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15. Shri Devji M. Patel
16. Smt. Bhavana Gawali (Patil)
17. Shri Jagdish Singh Rana
18. Shri Rajaiah Siricilla
19. Shri Patel Kishanbhai V.
20. Dr. Vinay Kumar Pandey 'Vinnu'
21. Shri Hukamdeo Narayan Yadav

#### RAJYA SABHA

22. Shri Satyavrat Chaturvedi
- \*23. Vacant
24. Smt. Mohsina Kidwai
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26. Dr. K.V.P. Ramachandra Rao
27. Shri Parshottam Khodabhai Rupala
28. Shri Rajpal Singh Saini
29. Shri Shivanand Tiwari
30. Shri S. Thangavelu
31. Shri Darshan Singh Yadav

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*\*Vice Shri A. Elavarasan who ceased to be the Member of the Committee on his retirement from Rajya Sabha on 24 July, 2013.*

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## **SECRETARIAT**

1. Shri R.S. Kambo - Joint Secretary
2. Shri P. C. Koul - Director
3. Shri R.S. Negi - Committee Officer

## INTRODUCTION

I, the Chairman, Committee on Agriculture having been authorized by the Committee to submit the Report on their behalf, present this Fiftieth Report on action taken by the Government on the Observations/ Recommendations contained in the Twenty-sixth Report of the Committee on Agriculture (2010-11) on “Development of Abiotic Stress Resistant Crop Varieties and Dissemination of Production Enhancing Technologies Review of R&D and Extension Efforts in the Country”.

2. The Twenty-sixth Report was presented to Lok Sabha and laid on the Table of Rajya Sabha on 30 August 2011. The Action Taken Replies on the Report were received on 29 November, 2011.

3. The Report was considered and adopted by the Committee at their Sitting held on 29 August, 2013.

4. An analysis of the action taken by the Government on the Observations/ Recommendations contained in the Twenty-sixth Report of the Committee is at **Annexure.**

**NEW DELHI;**  
**29 August, 2013**  
**07 Bhadrapada, 1935 (Saka)**

**BASUDEB ACHARIA**  
***Chairman,***  
***Committee on Agriculture.***

## CHAPTER-I

### R E P O R T

This Report of the Committee on Agriculture deals with the action taken by the Government on the Recommendations contained in the Twenty-sixth Report (Fifteenth Lok Sabha) of the Committee on Agriculture (2010-2011) on “Development of Abiotic Stress Resistant Crop Varieties and Dissemination of Production Enhancing Technologies Review of R&D and Extension Efforts in the Country” pertaining to Ministry of Agriculture (Department of Agricultural Research and Education) which was presented to Lok Sabha and laid on the Table of Rajya Sabha on 30 August 2011.

1.2 The Department of Agricultural Research & Education have furnished Action Taken Replies in respect of all the 21 Observations/Recommendations contained in the Report. These have been categorized as under:

- Observations/Recommendations that have been accepted by the Government:  
Recommendation Para Nos. 1.9, 1.11, 1.12, 2.18 & 2.19, 3.32, 3.33, 3.35, 3.36, 4.14, 4.15, 4.16, 4.18 and 4.19
- Observations/Recommendations which the Committee do not desire to pursue in view of the Government’s reply:  
Recommendation Para No. NIL
- Observations/Recommendations in respect of which action taken replies of the Government have not been accepted by the Committee:  
Recommendation Para Nos. 1.10, 2.20, 3.37, 3.38 and 4.17
- Observations/Recommendations in respect of which final replies of the Government are still awaited :  
Recommendation Para Nos. 2.17 and 3.34



**1.3 The Committee trust that utmost importance would be given to implementation of the observations/recommendations accepted by the Government. In cases, where it is not possible for the Department to implement the recommendations in letter and spirit for any reason, the matter should be reported to the Committee with reasons for non-implementation. The Committee desire that further Action Taken Notes on the Observations / Recommendations contained in Chapter-I and Final Action Taken Replies to the Recommendations contained in Chapter-V of this Report be furnished to them at an early date.**

1.4 The Committee will now deal with the action taken by the Government on some of the Recommendations in the succeeding paragraphs.

**Funds for Research on Agriculture and Allied Sectors**  
**(Recommendation Para No. 1.10)**

1.5 The Committee had noted that variability in weather particularly when almost 80 million hectares of land in India is rainfed posed serious challenges on the agri-sector, moreso, when inspite of the declining contribution of this sector to GDP drastically over the years, agriculture continued to provide livelihood to almost 60% of our workforce. They had further noted with disappointment that the Government, despite of being forewarned of the impending threats and their likely ramifications on the agriculture sector and livelihoods of million of people in the Forty-seventh Report (Fourteenth Lok Sabha) on 'Impact of Global Climate Change on Agriculture and Allied Sectors in India' had chosen to remain impervious to the gravity of the situation. Highly perturbed to note that the Government had singularly failed to adequately fund the research efforts of our research scientists, as had been time and again brought out in previous Reports of

the Committee, the Committee hoping against hope had expected that the situation on this front would witness a significant improvement at least during the Twelfth Plan.

1.6 The Government in their Action Taken Reply have stated that ICAR is proposing to address the issues such as Natural Resources degradation, Increasing Biotic and Abiotic Pressures, Input use Efficiency, Farm Mechanization, Harvest & Post Harvest Losses, Profitability in farming, Quality Human Resource and Farm Extension through establishment of Consortia Platforms in a mission mode approach in the Twelfth Five Year Plan. Some of the Consortia Platforms are Agri-Biodiversity Management, Genomics, Seed, Hybrids, Climate Change, Conservation Agriculture, Water and Waste Management, Health Foods, Feed & Fodder, Biofortification, Diagnostics and Vaccines, Nanotechnology, etc. Further approach will be on Productivity enhancement and Yield Gap Reduction, Extra Mural Funding, Establishment of Agri Innovation Fund, Regional Phytotron facilities, etc.

1.7 The ICAR through the National Agricultural Innovation Project (NAIP) is addressing the issues of climate change through mitigation measures to meet productivity under rainfed agriculture. Some of the good results emerging from the projects on ground are: 1) Networking water yielding borewells in dryland areas coupled with micro-irrigation systems to ensure atleast one crop i.e., Kharif, besides providing life saving irrigation to the second crop requiring less water during rabi. The results have been successfully demonstrated in Rangareddy district of Andhra Pradesh; 2) The nano-particles of phosphorus applied through soil application enhanced yield of crops like pearl millet by 15 to 30% in the semi-arid areas like Jodhpur in Rajasthan. The results of 2 years crop have shown promise for making

further effort in this direction; 3) A model of benefitting small holder through carbon finance has been demonstrated over a grid of more than 1500 ha involving 1450 farmers in the district of Warangal, Andhra Pradesh. By making a consortium of these farmers in a grid and planting timber and fruit trees, every farmer has started earning Rs. 7 to 8 thousand per year; 4) The proposals are being formed during XII Plan for ensuring timely availability of critical inputs for land preparation, seed and fertilizers. This is one such intervention besides technology which facilitates utilizing available soil moisture during the short periods of monsoon rains.

1.8 As part of National Initiative on Climate Resilient Agriculture (NICRA) project, KVKs have taken up activities relating to the major farming systems in 100 vulnerable districts for mitigation and adaptation to climate change. The focus of work include drought tolerant and early maturing varieties in rainfed crops, sub-mergence tolerant rice varieties in frequently flood or cyclone prone districts, varieties which escape terminal heat stress in the rabi crops, moisture conservation, zero tillage practices and agro forestry interventions for rehabilitation for degraded lands etc.

1.9 This could be possible only through enhanced allocation for XII Five Year Plan out of which a major share would be identified for research for improving crop productivity in rainfed agriculture. Revamping of higher agricultural education for improving and sustaining the quality, need priority attention by extending financial support to State Agricultural University for their research and education programmes.

1.10 The Working Group on Agriculture constituted by the Planning Commission also endorses the matter. The ICAR has proposed to address this issue through enhanced

allocation for 12th Five Year Plan out of which a major share would be identified for research for improving crop productivity in rainfed agriculture.

**1.11 The Committee note that ICAR propose to address a host of issues such as natural resource degradation, increasing abiotic and biotic pressures, input use efficiency, farm mechanisation, harvest and post harvest crop losses, profitability in farming, quality human resources and farm extension through establishment of consortia platforms in a mission mode approach in the Twelfth Plan. The Committee also note with satisfaction that ICAR through the National Agricultural Innovation Project (NAIP) has been addressing the issues of climate change through mitigation measures to meet productivity under rainfed agriculture. KVKs have taken up activities for mitigation and adoption to climate change under National Initiative on Climate Resilient Agriculture Project. Accordingly, the Department have proposed enhanced allocation for Twelfth Five Year Plan to strengthen research for improving crop productivity in rainfed agriculture, revamping of higher agricultural education for improving and sustaining the quality and financial support to State Agricultural Universities for Research and Education Programmes. The working group on Agriculture, constituted by the Planning Commission, has also endorsed this proposal of the Department of Agricultural Research and Education. The moot point, however, remains where is the money. The Government in their wisdom, and quite like in the past is yet to finalise the Twelfth Plan though the first Fiscal of the Plan is soon going to be over. Notwithstanding, the sincere efforts of our Agricultural Scientists, their plans and endeavours will only bear fruit when the research being conducted in**

**NARS is funded as per the requirements. The Committee, however, note with indignation that in the ongoing Fiscal, which is the first year of Twelfth Plan, the Government has merely gone through the motion of allocations without any concern for the mammoth challenge that NARS has to tackle in the form of climate change and global warming and innumerable problems flowing in their wake. This failure of the Government, becomes all the more glaring in view of the fact that the Committee in most of their previous Reports had forewarned Government to diligently and professionally approach the Planning Commission and ensure timely finalisation of Twelfth Plan so that it is conveyed to all by December, 2011 and, all Ministries/Departments would start implementation of Twelfth Plan Schemes from day one of the Plan i.e. 1 April, 2012.**

**1.12 The Committee strongly feel that incalculable harm has been done to various new Schemes as well as ongoing Schemes of DARE due to dithering of the Government in finalising the Twelfth Plan. They, therefore, recommend with all force at their command that Twelfth Plan finalisation be attended to by the Government on war footing basis so that it does not meet the fate of Eleventh Plan and the implementation of several crucial schemes of DARE commences in right earnest without any further delay.**

**Impact of Abiotic Stresses on Agriculture Produce  
(Recommendation Para No. 2.17)**

1.13 Having noted with a sense of trepidation, the continued havoc caused by abiotic stresses to the agriculture and allied sector produce of the Country, since till date effective solutions for tackling abiotic stresses and other factors were not readily

available, the Committee had further noted that as compared to the staggering losses during 1987, 2002 and 2004 loss of food grain production was prevented to a certain extent during the 2009 drought. This happened because ICAR took several pro-active measures including compiling all the available research information including varietal and emergent strategies on contingency plans for facing anticipated eventualities. The efforts of ICAR were also ably supplemented by weather forecasting of agro-advisories in local languages by the State Agriculture Universities. While acknowledging the exemplary drought mitigation efforts of 2009 as trend setter for the future strategies for tackling calamities caused by abiotic stresses, the Committee had felt that apart from the need of institutionalizing a coordinated multi-agency and multi-disciplinary strategy, a lot needed to be done on the research and development front by the ICAR.

1.14 The Department of Agricultural Research and Education in their Action Taken Note have stated that in order to mitigate the anticipated abiotic and biotic stress in crop production, frontier science-based research to exploit explored genetic systems for being introgressed into crops is proposed in the next Plan period. Efforts are being made to develop second generation technologies with the help of biotechnological tools to cope up with the climate change induced abiotic stresses and drought-proofing. A National Institute on Abiotic Stress Management has been established in Baramati, Pune to conduct upstream multi-disciplinary research with state-of the art infrastructure. CRIDA, CAZRI, CSSRI and CSWCRTI are also strengthening their research on drought proofing and water harvesting. Efforts are being made to strengthen the agroforestry component research in watershed management based agricultural production mechanism.

1.15 The ICAR is developing designer varieties to combat heat tolerance, drought tolerance and other abiotic stresses in different crops in near future. Root-stock research using dogridge in grapes has given varieties resistant to heat tolerance. Apart from this efforts are being made to develop heat tolerance varieties in chillies, tomato, French beans and pea varieties.

1.16 The efforts of ICAR for improvisation in forewarning of weather conditions as well as release of necessary agro-advisories to farmers in local languages is being relooked. Enhanced efficiency for prompt advisories through Information and Communication Technology (ICT) to reach each Panchayat could sensitize the access to the relevant knowledge for farmers.

**1.17 The Committee note that the Department of Agricultural Research and Education have with a view to mitigate the anticipated abiotic and biotic stress in crop production, propose frontier science based research to exploit explored genetic system for introgressed into crops in the Twelfth Five Year Plan period. They appreciate that the Department have initiated efforts to develop second generation technologies with the help of biotechnological tools to cope with the climate change induced abiotic stresses and drought proofing. The Committee also note with satisfaction that apart from strengthening focussed research on drought proofing and water harvesting at existing institutions viz. CRIDA, CAZRI, CSSRI and CSWCRTI, a National Institute for Abiotic Stress Management at Baramati. The Council is also developing designer varieties to combat heat tolerance, drought tolerance and other abiotic stresses in different crops. The Committee would like the Council to work with renewed vigour on all these**

**schemes and programmes as the harmful efforts of global warming and climate are already at our door and there is no further scope for procrastination.**

**1.18 The Committee find that the ICAR proposes to relook into improvisation of forewarning of weather conditions and also release of agro-advisories in local languages. The Committee would like to be apprised of the present status of this proposal. At the same time, the Committee exhort the Government to make use of the Information and Communication Technology (ICT) so as to ensure efficient and prompt delivery of advisories to the farmers. The Committee are of the opinion that the use of ICT will certainly go a long way in minimizing the stress, both biotic and abiotic crops to a great extent.**

**Technologies to Mitigate Abiotic and Biotic Stresses  
(Recommendation Para Nos. 2.18 and 2.19)**

1.19 Noting the grim projections made by the Inter-Governmental Panel on Climate Control (IPCC), a UN body about the increase in global temperature and its consequences in the form of decrease in production of grain, rice, maize and a variety of other crops, the Committee while appreciating the fact that the Government was aware of all these implications had felt that various Ministries/Departments of the Government need to put their heads together so as to devise strategies to meet these challenges and DARE/ICAR being the nodal body of the National Agricultural Research System, ought to play a proactive role in facilitating the creation of such an inter-ministerial body for devising the strategies, working out interfaces, putting a suitable mechanism in place and finally for implementation of those strategies.



1.20 The Government in their Action Taken Note have stated that several crop varieties, that are terminal heat tolerant as in wheat, or sustain inundation due to unseasonal rainfall as in rice have been developed and are popularized in relevant agro-ecologies.

### **List of some important varieties resistant to abiotic stresses in different crops**

#### **Drought**

**Wheat :** PBW 527, HD 2888, HI 153, HI 1500, HD 8627, HS 507, VL829, VL 892, WH 1080, HD 2781, HW 1085

**Barley :** HBL 276, RD 2660, K 603

**Rice:** Sahabhagi Dhan, Vandana, Annada, Annapurna, Anjali, Dateswari, PNR – 519, VL Dhan 208, Abhisek, Virendra , Sadabahar, Hazaridhan Govind, Heera, Tulasi, Shusk, Samrat.

**Maize :** Pusa Hybrid Makka- 1,2 and 5, Vivke-21, Vevek-23, HM-4

**Sorghum :** Maldandi 35-1, Phule-Maulee

**Pearl Millet :** HHB 67 improved, GHB-757, GHB-538, RHB 177, HHB 226, HHB 216, RHB 154, GHB 719, HHB 68

**Chickpea :** RSG 44, RSG 888, S26, BGD 72,Vijay, Pusa 362, Pusa 362, Pusa 1103

**Mothbean :** CZM 1, CZM 2, CZM 3

**Cotton :** HD 324, CICR-1, Raj DH7, CSHH 198, PKV Hy 5, Jawahar Tapti, Pratap Kapi, PA 225, G.Cot.15, G.Cot.18, NH 545, LRA 5166, AK 235, Suraj, Surabhi, Sumangala, Veena .

**Sugarcane:** Co 94008 (Shyama), Co 99004 (Damodar), Co 2001-3 (Sulabh), Co 2001-15 (Mangal), Karan-1, Karan-4.

## **Salinity**

**Rice** : CR Dhan 402, CR Dhan 403, CSR 30, CSR 27, CSR-36, Narendar Ushar Sankar Dhan 3, Lunishri, Bhutnath, DRR Dahn 39, Jarava, Sumati, Vikas

**Wheat** : KRL-14, KRL-19, KRL-210, KRL-213.

**Chickpea** : ICCV6, Karnal Chana 1

**Cotton** :AAH1, CICR-2, Raj DH 9, G27, Pusa Ageti

**Sugarcane**: Co 94008 (Shyama), Co 99004 (Damodar), Co 2001-3 (Sulabh), Co 2001-15 (Mangal).

**Guinea Grass**: **For acid soil** : Hamil, PGG-1; **For Degraded forests and ravines**; Hamil, PGG 14 & PGG 19; **for Coastal saline** : Hamil, PGG-14

## **Submergence**

**Rice** : Swarna Sub-1, IR 64 Sub-1

## **Deep Water**

**Rice** : Jitendra, Dinesh, Jaladhi, Neeraja

## **High temperature**

**Wheat**- WH 730, NIAW 34, Raj 3765 and DBW 14, HD 2808 and Raj 4037

**Mungbean**: HUM 1,16, Samrat, Meha, IPM 02-3, IPM 02-14, Pant Mung 5 and SML 668, Pusa Vishal

**Urdbean**: WBU 109, KU 96-3 and Pant U 35.

**Fieldpea** Adarsh, Prakash, Vikash and Pant Pea 42

**Maize Hybrids** : Prakash, Buland, PMH-1, PMH-3, HM-9 and HQPM-1

It has been further stated that biotechnological research in the direction of crop improvement to integrate and fortify crop genomes with beneficial genes for various abiotic and biotic stresses would be intensified.

1.21 The ICAR is in the process of strengthening simulation and modeling for developing forewarning and forecasting of major impacts of climate change to help undertake mitigation measures. With this view, the NPCC is being merged with NICRA in the 12<sup>th</sup> Plan to have holistic solutions. The newly established NIASM is also mandated with this activity.

1.22 The simulation model to predict the likely change has indicated that there could be a decline in production, which is largely based on data of the change in temperature and humidity. The simulation model has not taken into account the changes in technologies and cultivars. The expected decline in production of many horticultural crops will be a reality if new technologies to mitigate the problems arising due to climate change is not developed. Therefore, the ICAR has given major focus on developing cultivars and technologies which will mitigate the problems arising due to temperature, salinity and biotic/abiotic stresses. Research on these aspects for adoption to climate change has been intensified through conventional breeding. Many lines have been developed in chillies, tomato, potato, capsicum which will have some kind of resistance to arising temperature. Cultivars 7-6XKTP4 in pea, F6CHT1 in capsicum are less sensitive to high temperature. In case of potato, variety Kufri Suriya has been developed which can be grown in the higher temperature regime. Genetic prospecting, genomics and allele mining are being attempted to develop varieties which can resist the higher temperature as well as abiotic stresses. In case of potato, complete sequencing of genome has been done which is a major breakthrough for understanding potato genes and the information will be utilized for developing designer cultivar of potato. Similarly, rootstock research has been identified to mitigate problems of abiotic

stresses arising in the soil and also tolerant rootstock dogridge, which is commercially used.

1.23 Allele mining and bioprospecting in livestock has been taken up to understand the possible impact of climate change. Appropriate shelters are being designed for cattle, sheep, goats and pigs under NICRA Project to minimize the extreme effects of climate change. In XII Plan, mission on pig, rural poultry, goat production, and feed and fodder development is being proposed.

**1.24 The Committee note that the simulation model used for making the IPCC forecast about the likely change has indicated that there could be a decline in production, which is largely based on data of the change in temperature and humidity. The simulation model has not taken into account the changes in technologies and cultivars. The expected decline in production of many horticultural crops will be reality only if new technologies to mitigate the problems arising due to climate change are not developed. The Committee are, therefore, confident that the scenario is not that bleak and if technological innovations keep step with the negative impact of climate change, then the harmful effects on crop production, etc. can be mitigated substantially.**

**1.25 The Committee further note with satisfaction that DARE/ICAR are already in the midst of countering the threat posed by climate change and related aspects. Several varieties in different crops like Wheat, Barley, Rice, Maize, Sorghum, Cotton, Sugarcane, Pearl Millet, etc. which are resistant to specific abiotic stresses have been developed are popularised in relevant agro-ecologies.**

**1.26 With a view to help undertake mitigation measures, ICAR is in the process of strengthening simulation and modelling for developing forewarning and forecasting of major impacts of climate change.**

**1.27 The Committee while appreciating the slew of measures taken by DARE/ICAR in the direction of tackling the negative impact of climate change, on both crops and livestock, feel that this is a very prolonged and continuous war which, as the things worsen, will be required to be fought on a multi-dimensional plane. Thus, DARE/ICAR should never let down their guard and keep on evolving strategies to mitigate the newer and newer threat emerging due to climate change.**

**1.28 The Committee also note that the National Action Plan on climate change under the Chairmanship of Prime Minister has been set-up. Eight missions including different sectors have been formulated under the Action Plan. While, the Committee hope that the Government will work on the implementation of the Action Plan in right earnest and ensure its success expeditiously, they would also like to be apprised of progress made so far on the Action Plan.**

**Mapping of Soil Fertility**  
**(Recommendation Para No. 2.20)**

1.29 Having noted the depletion of natural resources such as water and nutrients caused by intensive agricultural practices in various parts of the Country and further noting with dismay that the Government had till then prepared soil maps of micronutrients (NPK) for only 20 States and micronutrients map for only 10 States, the Committee had asked the Government to complete the mapping of soil fertility of all the

remaining States in a time bound manner as this step would also contribute significantly in the strategies being evolved for tackling abiotic stresses.

1.30 In their Action Taken Notes the Government have stated that keeping in view the immense importance of soil fertility mapping, the ICAR has taken initiative to prepare GIS based soil fertility mapping for macro, secondary and micronutrients at district or even block level in 21 States. The programme is being funded by Department of Agriculture & Cooperation, Ministry of Agriculture. So far mapping of 65 districts of the country has been completed by various AICRP on Soil Test Crop Response centres. These maps will be useful for monitoring of soil fertility at district/block level fertilizer recommendations and distribution of fertilizers etc. to ensure balance fertilization and thereby improving soil health and crop productivity in the country. It is projected that mapping of all the 171 districts would be completed by September, 2012 and soil fertility mapping of rest of about 430 districts would be completed in second phase of the project.

**1.31 The Committee find the progress made in this project unsatisfactory. The preparation of GIS based soil fertility mapping for macro, secondary and micronutrients is the minimum pre-requisite for the mitigation planning to commence. Unless this is done the mitigation strategies cannot be put in place what to speak of implementing the mitigation measures. The Committee, therefore, reiterate their earlier recommendation and desire the Department to complete the mapping in a time bound manner and on a war footing.**

**Bio-Prospecting of Genes and Allele Mining**  
**(Recommendation Para No. 3.34)**

1.32 Finding that out of the approved allocation of Rs. 57.13 crore during 2009-10 for bio-prospecting of genes and allele mining for abiotic stress tolerance project, only Rs. 32.10 crore was sanctioned in 2009-10 of which Rs. 16.03 crore only had been released for the project, the Committee opined that starving this Scheme of funds in the initial stages would hamper the research activities in this vital field and, therefore, recommended that funds once sanctioned for such pivotal projects should be released in time in the future so as to ensure that research was carried on uninterruptedly and unaffected in any manner by paucity of funds.

1.33 The Government in their Action Taken Note have informed the Committee that the NAIP funded project on “Bioprospecting of genes and allele mining for abiotic stress tolerance” is in operation at 36 different centres with NRC on Plant Biotechnology as the lead centre. By June 2011 a total of Rs.4258.874 lakhs have been released of which Rs.35.92 crore have been spent so far (84.35% utilization). The rest amount out of the total sanctioned budget of Rs. 57.13 crore is released in the year 2011-12 so that all the activities are carried out and all the projected objectives are met.

1.34 The project has already made significant progress with regard to generation of resource base for gene prospecting in all the target species including moth bean, lathyrus, goat, camel, fish species in which very little information was available. Many stress responsive genes have been cloned and some of them are being functionally validated. While most of the objectives will be met during the project period of three months by March 2012, some aspects would require extension of the project period by another one and a half year in view of the fact that the traits being handled are of

complex nature and many of the species from which genes are being prospected have not been worked out earlier, which demand more time and efforts.

1.35 Further studies are aimed on chilli, tomato, capsicum, onion and peas and on several cucumis species at IIHR, Bengaluru and IIVR, Varanasi, and also to initiate same studies on potato at CPRI, Shimla and at IISR, Calicut on spices. Forty two genotypes of cucumber and 48 genotypes of musk melon at IIHR and 16 genotypes of cucumber and 19 genotypes of musk melon were screened at IIVR against water stress. In due course of time, ICAR may be able to solve the problem of abiotic stress tolerance in various horticultural crops.

**1.36 The Committee are disappointed to note that the Department have been able to spend only 84.35% funds under bio-prospecting of genes and allele mining for abiotic stress tolerance project till June, 2011 i.e. well after even the Fiscal next to 2009-10 has been over. This is not a happy state of affairs. They desire the Department to inform the details of the objectives of the project could not obtained due to underutilisation funds under the project alongwith the status of the project as on date.**

**Impact, Adoption and Vulnerability of Agriculture to Climate Change**  
**(Recommendation Para No. 3.37)**

1.37 Having found that under the project entitled 'Impacts, adaption and vulnerability of Indian Agriculture to climate change' with the objective of quantifying the sensitivity of crops including horticultural crops and plantations, soil, water, fish and livestock to climate changes which was launched in 2004. ICAR had not undertaken any projects on soil during the year 2007-08 and 2008-09 and the funds allocated under the projects



were not fully utilized during the year 2007-08, 2008-09 and 2009-10, the Committee had desired the Department to improve their management of finances so that not only precious resources were fully utilized but also the timelines for various components of the Project achieved without any cost over runs.

1.38 The Government in their Action Taken Note have stated that the research on assessing sensitivity of crop to climate change in food crops has resulted in identifying breeding materials that are less affected and are being put to use in breeding for new crop varieties.

1.39 The adaptation and mitigation through enhanced water productivity, nutrient use efficiency, and conservation agriculture and agro-forestry systems is already included under NICRA which aims at designing and development of suitable soil-water management practices for enhancing climate resilience.

1.40 The horticulture component of this project is taken up at IIHR, Bangalore and IIVR, Varanasi to identify and develop tomato, french bean, chillies etc. varieties tolerant to climatic stress (heat and water deficit) for different agro climatic regions and varying seasons in the country. In tomato, 225 lines have already been screened against heat stress and promising lines have been sorted out. The source of resistance to high temperature in frenchbean was also identified. Thirty chilli lines were screened for water stress tolerance and four onion lines were identified to soil moisture stress.

**1.41 The Committee take due note of the details of activities undertaken by the ICAR under impacts, adaption and vulnerability of Indian Agriculture to Climate Change Project. They, however, find it inexplicable as to why the Department have chosen to remain silent in regard to under/non-utilization of funds under the**

project during 2007-08, 2008-09 and 2009-10. They, therefore, reiterate their earlier recommendation and desire a specific response from the Department at the earliest.

**Contingency Planning**  
**(Recommendation Para No. 3.38)**

1.42 The Committee having observed that out of 575 Districts targeted for the Contingency Plans, 102 Plans had been completed and 257 Plans were under preparation but a large number of districts in States like Madhya Pradesh, Himachal Pradesh, Jammu and Kashmir, Uttar Pradesh, Bihar, Chhattisgarh, Jharkhand and Assam were yet to be taken up by the Government for District Contingency Planning, they had recommended the Government to take up these activities in a uniform manner so that all the States could avail the benefit of Contingency Plan simultaneously. The Committee had also recommended that the preparations of Plans in the remaining 216 Districts be completed by the Government at the earliest.

1.43 The Government in their Action Taken Note have stated that the Contingency Plans for 209 districts have been completed so far. These include 22 in Andhra Pradesh, 23 in Gujarat, 19 in Haryana, 24 in Karnataka, 14 in Kerala, 21 in Maharashtra, 27 in Orissa, 19 in Punjab, 9 in Rajasthan and 31 in Tamil Nadu. By March 2012, district plans will be completed for a total of 350 districts and remaining districts in the other States will be completed on priority.

**1.44 The Committee are dismayed with the slow progress of execution of the Scheme. They are further dismayed to note that despite their recommendation to cover all States in a uniform manner the States like Assam, Madhya Pradesh,**

Himachal Pradesh, Jammu & Kashmir, Uttar Pradesh, Uttarakhand, Bihar, Chhattisgarh, Jharkhand and West Bengal have not yet found place even in the list of 209 districts. The Committee, therefore, reiterate their earlier recommendation and desire the Department to get the needful done without any further delay.

**Norms for Krishi Vigyan Kendras (KVKs)**  
**(Recommendation Para No. 4.14)**

1.45 The Committee had noted as many as 589 Krishi Vigyan Kendras (KVKs) were operational and the Department plan to establish a total of 667 KVKs by the end of the Eleventh Plan. As a part of the perspective planning, the Department intend to establish one additional KVK in each of the 50 larger districts keeping in view the potential of the district for agricultural growth and scope of diversification in addition to the geographical area, rural population and net sown area. While appreciating this initiative of the DARE/ICAR to increase the number of KVKs in the country, the Committee had desired that the norms of establishing a KVK be reviewed so as to improve the accessibility of the farmers to them.

1.46 The Government in their Action Taken Note have stated that as a standard practice, as site selection committee headed by an eminent agricultural scientist assesses the logistics available in a district for establishing a KVK keeping in view the availability of land and its location accessible to farmers. In order to select most appropriate site for setting up a KVK, need based changes in the site selection criteria have been made from time to time. The KVKs of 100 districts of the country which are

vulnerable to climate change have been given responsibility to conduct demonstrations of available climate resilient technologies at farmers' field under NICRA.

**1.47 The Committee are not convinced with the contention of DARE/ICAR that need-based changes in the site selection criteria for establishing Krishi Vigyan Kendra (KVK) have been made from time to time. Taking into consideration, the pace at which the KVKs have been set up in the past, as against a target of 667 KVKs and more than one in larger districts by the end of Eleventh Five Year Plan, 600 odd KVKs have been set up throughout the country – there is a dire need to review and upgrade the existing norms. Re-iterating their earlier recommendation, the Committee desire that the norms for establishing a KVK be reviewed urgently, so as to ensure improved farm extension services to the farmers. This may also hasten the speed of setting up of KVKs in the remaining uncovered districts of the country.**

**Setting up of Weather Station/Automatic Weather Stations in KVKs.**  
**(Recommendation Para No. 4.17)**

1.48 Having noted that inspite of the fact that keeping the farmers constantly updated on weather information could play a major role in improving the agriculture production in the Country, there were very few Krishi Vigyan Kendras in which weather stations have so far been established by the Indian Meteorological Department, the Committee had recommended the Department to take up the issue of setting up of weather stations/automatic weather stations with the Indian Meteorological Department so that all the KVKs were provided with agro-met observatory and were in a position to provide farmers weather updates timely and in the event of any natural calamities enable them

to take a pre-emptive course of action to save their precious produce from falling prey to the fury of nature.

1.49 The Government in their Action Taken Note stated that appreciating the need for Agro Advisories for the farming community, the ICAR has so far set up the weather stations/automatic weather stations at 270 centres at SAUs and plans to set up another 100 such stations in KVKs in 100 vulnerable districts under National Initiative on Climate Resilient Agriculture (NICRA).

**1.50 Noting the absence of weather stations in Krishi Vigyan Kendras (KVKs) and appreciating the importance of timely dissemination of Agro Advisories for the farming community the Committee had recommended setting up of weather stations/automatic weather stations in all the KVKs. They, therefore, find it highly perplexing as to why the Department are still proposing only 100 such stations in KVKs in vulnerable districts under National Initiative on Climate Resilient Agriculture. The Committee understand that several of the KVKs are attached to SAUs. Still the farmers access to KVKs is far more easy as compared to the SAUs. They, therefore, reiterate their earlier recommendation and desire the Department to expeditiously take up the matter with Indian Meteorological Department so that weather stations/automatic weather stations are set up in all KVKs.**

## **CHAPTER - II**

### **Observations/Recommendations that have been accepted by the Government**

#### **RECOMMENDATION SERIAL NO. 1.9**

In the considered opinion of the Committee, apart from the Indian farmer, it is the National Agricultural Research System with ICAR as its guiding spirit which has ensured the food security and safety of the Country. With 45 Research Institutes, 4 Deemed Universities, 6 National Bureaux, 17 National Research Centers, 25 Directorates/Project Directorates, 61 All India Coordinated Research Projects and 17 Network Projects forming the Research and Development core and 45 State Agricultural Universities, one Central Agricultural University and 584 KVK forming the bulwark of the Extension Services, the DARE/ICAR network has contributed significantly towards self-reliance and development of agriculture and allied sectors in India. Having successfully met the challenge of ensuring food security during the last five odd decades, ICAR need to now gear up to face many different types of challenges. The increased economic and industrial activities have led to a paradigm shift in the climate and environment of the world. Apart from the diseases and pestilence, new threats are emerging to agriculture sector due to global warming and climate change etc. In such a scenario, agriculture which is inherently sensitive to climatic conditions had acquired additional vulnerability, which at the present juncture is highly unpredictable.

#### **Reply of the Government**

ICAR has already established the National Institute for Abiotic Stress Management in Baramati, Maharashtra to cater to different abiotic stresses including heat, cold, drought, flood, etc. on soil, crop, microbes, fisheries, and livestock. Further, intensification of these efforts are in process of establishment of Indian Institute for

Agricultural Biotechnology at Ranchi, Jharkhand and National Institute of Biotic Stress Management at Raipur, Chhatisgarh. These institutions are to take up multidisciplinary science to address the new and emerging threats that challenge crop productivity in agricultural sector.

The Council had also initiated a Network Project on Impacts, Adaptation and Vulnerability of Indian Agriculture to Climate Change at 15 locations which was extended to 23 locations during XI Plan. To augment the efforts, ICAR launched National Initiative on Climate Resilient Agriculture (NICRA) with a total budget of Rs. 350 crores for the period 2010-2012. The NICRA aims to assess the impact of climate change on agriculture and allied sectors in the country and evolve cost effective adaptation and mitigation strategies.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

#### **RECOMMENDATION SERIAL NO. 1.11**

The Committee would like to caution the Government that climate change presents an unprecedented situation before a developing Country like India. The most worrisome aspect being the unpredictability of the dimensions of the problem; the overt dependence of Indian agriculture on monsoon; the pre-dominance of small and marginal farmers and several landless who do not have secure livelihoods; the more or less plateauing of the agricultural production; the continuing socio-economic downgrading of agriculture as a profession to cite a few.

#### **Reply of the Government**

Recognizing the problems of small and marginal farmers with declining profitability of land, the ICAR has provided major focus for the technological development to increase their livelihood. Efforts of ICAR in terms of technology

generation have provided development of many varieties and technologies which can enhance profitability of the land and can attract the youths.

Presently available crop production technologies such as intercropping, relay cropping, cultivation of rice fallows with short duration remunerative crops such as pulses could help the category of landless, small or marginal farmers. Integrated Farming System (IFS) models for different agro-ecological zones have been developed through AICRP on Integrated Farming Systems nation-wide to enhance productivity, profitability and livelihoods, particularly for small and marginal farm-holders. The IFS will also help in generating rural employment.

The technologies like use of hybrid seeds, protected cultivation, micro-irrigation, use of tissue culture plants, disease free quality seed and planting materials and efficient nutrient and plant health management have been largely adopted by marginal farmers. The mushroom cultivation and also the honey bee as pollinizers have also provided opportunities for landless labourers to enhance their income. The vegetable cultivation including potato, growing of flowers, seed spices, medicinal and aromatic plants have resultantly increased the income per unit area.

Research has been carried out in developing pig villages in NEH Region for rearing pigs with optimal performing breeds for reducing shortage of animal proteins and providing livelihood to landless labourers and to unemployed youth. Poultry strains of Vanaraja and Grampriya have been developed for optimal performance under rural and backyard poultry production systems for improving livelihood security of small & marginal farmers and landless labourers. Appropriate shelters are being designed for cattle, sheep, goats and pigs under NICRA Project to minimize the extreme effects of climate change.

ICAR institutes have developed improved tools and implements for small and marginal farmers to facilitate timeliness of operations which, otherwise, is critical to mitigate abiotic stresses. Use of such tools and equipment enhance the application



efficiency of inputs and reduce the drudgery of workers. Emphasis has been given to design gender-friendly tools as a large number of women workers are engaged in farming activities. Besides, custom hiring of location-specific farm equipment is now a fast-evolving rural enterprise which is beneficial to small farmers as well as landless workers. In addition, energy gadgets such as solar cooker, improved cook stove, solar dryer and biogas plants have proved helpful to improve livelihood of small farmers.

Fisheries in India has contributed to a large extent to the small scale sector. The culture based capture in water bodies like flood-plains, in eastern part of the country and filling of reservoirs upto optimum capacity and water availability to enable freshwater aquaculture systems depend on success of monsoon every year. To enable the poor and vulnerable fishermen for their economic empowerment, ICAR has developed easily adaptable technologies like small scale aqua farming in ponds, seed production, coastal aquaculture technologies, marine and inland aquaculture technologies, mussel farming, oyster farming, poly-lined pond culture systems for hill areas and technology for ornamental fish culture. The aqua farming will improve the economic status of the landless rural poor. Hygienic fish drying/ smoking technologies and value addition to low value fishes developed by CIFT will also help poor farmers fetch more price for their commodity.

Need based training programmes are also conducted by KVKs for farmers including those having small and marginal land holdings, besides landless farmers with focus on livelihood security interventions.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

## **RECOMMENDATION SERIAL NO. 1.12**

As would be clear from the succeeding Chapters, the National Agricultural Research System is fully seized of the gravity of the problem and is also working on several solutions both long and short term, to mitigate the problems that are arising/may arise from climate change. Unfortunately, however, the requisite support of the political leadership and the policy makers is not forthcoming at the requisite levels and with due alacrity. The food security of the Country has been earned through the relentless toil of our farmers and the selfless services of our scientists in the public sector and it should not be frittered away due to unimaginative planning and wrong priorities. If we have to ensure food security for our population in the coming years, the Research and Development efforts of National Agricultural Research System in agriculture sector are to be catered to the fullest and with all promptitude. The Committee expect the Government to wake from its slumber and do the needful at least in the Twelfth Plan. The Committee also expect the Department to put their proposals before the planners and the Government more forcefully and purposefully so that their voice is heard and their financial requirements are met on priority.

### **Reply of the Government**

Keeping in view the priorities for improving crop productivity in rain-fed agriculture, ICAR is proposing to address the concerns such as Natural Resources Degradation, Increasing Biotic and Abiotic Pressures, Input use Efficiency, Farm Mechanization Harvest & Post Harvest Losses, Profitability in farming, Quality Human Resource and Farm Extension through establishment of Consortia Platforms on Agri-Biodiversity Management, Genomics, Seed, Hybrids, Climate Change, Conservation Agriculture, Water and Waste Management, Health Foods, Feed & Fodder, Biofortification, Diagnostics and Vaccines, Nanotechnology, etc. in a mission mode approach during the XII Five Year Plan. Further approach will be on productivity

enhancement and yield gap reduction, extra mural funding, Establishment of Agri Innovation Fund, Regional Phytotron facilities etc.

Establishment of National Institute of Biotic Stress Management, Indian Institute of Agricultural Biotechnology besides Central Agricultural Universities in Bundelkhand, Barapani and Bihar is in the final stage and need adequate funding for development of infrastructure & technology development. Consortia/Platform approaches, Inter-Departmental Platforms, National Agricultural Education Project and National Agricultural Science Foundation, etc. have been proposed with enhanced fund allocation during XII Five Year Plan.

The ICAR is operating few projects under NAIP in order to mitigate the effects of climate change. Some of the major efforts are towards developing heat tolerant, salt tolerant and submergence tolerant varieties of food crops. Besides, some tree species of economic value like tree fodder, oil bearing trees, resin yielding trees, etc. have also been introduced and demonstrated through agro-forestry.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

## **RECOMMENDATION SERIAL NO. 2.18**

The abiotic and biotic stresses have as old a history as agriculture itself. The only difference now being that the climate change and global warming have fastened the pace of natural vagaries. This can be gauged from the fact that the twelve of the years between 1995 and 2008 have been the warmest in the instrumental record of global surface temperature since 1850. The Inter-Governmental Panel on Climate Control a UN body has projected that global annual temperature is likely to increase in the range of 1.4 to 4.5°C by the end of this century, leading to increased precipitation, more intense tropical cyclones, higher peak wind speeds causing hot extremes, heat waves and heavy precipitation events more

frequently. The Committee have also been informed by the Department that in the aftermath of IPCC report and other studies, simulation studies have been carried out under Network Project on Climate Change. To them, the outcome of these simulations presents a very bleak scenario in the Indian context. The irrigated wheat production may reduce by 5% in 2030 and by almost one fourth in 2080; reduction in irrigated rice production likely to be about 2% in 2030 and upto 10% upto 2080; refined rice production to increase by 2% upto 2030 but dip by 8% by 2080; irrigated Kharif maize to decrease by almost 9% by 2030; varying effects on production of potato, soybean, groundnut, etc; decreased milk production in livestock.

### **Reply of the Government**

Several crop varieties, that are terminal heat tolerant as in wheat crop, or sustain inundation due to unseasonal rainfall as in rice have been developed and are popularized in relevant agro-ecologies.

#### **List of some important varieties resistant to abiotic stresses in different crops Drought**

**Wheat** : PBW 527, HD 2888, HI 153, HI 1500, HD 8627, HS 507, VL829, VL 892, WH 1080, HD 2781, HW 1085

**Barley** : HBL 276, RD 2660, K 603

**Rice**: Sahabhazi Dhan, Vandana, Annada, Annapurna, Anjali, Dateswari, PNR – 519, VL Dhan 208, Abhisek, Virendra, Sadabahar, Hazaridhan Govind, Heera, Tulasi, Shusk, Samrat.

**Maize** : Pusa Hybrid Makka- 1,2 and 5, Vivke-21, Vevek-23, HM-4

**Sorghum** : Maldandi 35-1, Phule-Maulee

**Pearl Millet** : HHB 67 improved, GHB-757, GHB-538, RHB 177, HHB 226, HHB 216, RHB 154, GHB 719, HHB 68

**Chickpea** : RSG 44, RSG 888, S26, BGD 72,Vijay, Pusa 362, Pusa 362, Pusa 1103

**Mothbean** : CZM 1, CZM 2, CZM 3

**Cotton** : HD 324, CICR-1, Raj DH7, CSHH 198, PKV Hy 5, Jawahar Tapti, Pratap Kapi, PA 225, G.Cot.15, G.Cot.18, NH 545, LRA 5166, AK 235, Suraj, Surabhi, Sumangala, Veena .

**Sugarcane**: Co 94008 (Shyama), Co 99004 (Damodar), Co 2001-3 (Sulabh), Co 2001-15 (Mangal), Karan-1, Karan-4.

### **Salinity**

**Rice** : CR Dhan 402, CR Dhan 403, CSR 30, CSR 27, CSR-36, Narendar Ushar Sankar Dhan 3, Lunishri, Bhutnath, DRR Dahn 39, Jarava, Sumati, Vikas

**Wheat** : KRL-14, KRL-19, KRL-210, KRL-213.

**Chickpea** : ICCV6, Karnal Chana 1

**Cotton** :AAH1, CICR-2, Raj DH 9, G27, Pusa Ageti

**Sugarcane**: Co 94008 (Shyama), Co 99004 (Damodar), Co 2001-3 (Sulabh), Co 2001-15 (Mangal).

**Guinea Grass**: **For acid soil** : Hamil, PGG-1; **For Degraded forests and ravines**; Hamil, PGG 14 & PGG 19; **for Coastal saline** : Hamil, PGG-14

### **Submergence**

**Rice** : Swarna Sub-1, IR 64 Sub-1

### **Deep Water**

**Rice** : Jitendra, Dinesh, Jaladhi, Neeraja

### **High temperature**

**Wheat**- WH 730, NIAW 34, Raj 3765 and DBW 14, HD 2808 and Raj 4037

**Mungbean**: HUM 1,16, Samrat, Meha, IPM 02-3, IPM 02-14, Pant Mung 5 and SML 668, Pusa Vishal

**Urdbean**: WBU 109, KU 96-3 and Pant U 35.

**Fieldpea** Adarsh, Prakash, Vikash and Pant Pea 42

**Maize Hybrids** : Prakash, Buland, PMH-1, PMH-3, HM-9 and HQPM-1

Biotechnological research in the direction of crop improvement to integrate and fortify crop genomes with beneficial genes for various abiotic and biotic stresses would be intensified.

The ICAR is in the process of strengthening simulation and modeling for developing forewarning and forecasting of major impacts of climate change to help undertake mitigation measures. With this view, the NPCC is being merged with NICRA in the 12<sup>th</sup> Plan to have holistic solutions. The newly established NIASM is also mandated with this activity.

The simulation model to predict the likely change has indicated that there could be a decline in production, which is largely based on data of the change in temperature and humidity. The simulation model has not taken into account the changes in technologies and cultivars. The expected decline in production of many horticultural crops will be a reality if new technologies to mitigate the problems arising due to climate change is not developed. Therefore, the ICAR has given major focus on developing cultivars and technologies which will mitigate the problems arising due to temperature, salinity and biotic/abiotic stresses. Research on these aspects for adoption to climate change has been intensified through conventional breeding. Many lines have been developed in chillies, tomato, potato, capsicum which will have some kind of resistance to arising temperature. Cultivars 7-6XKTP4 in pea, F6CHT1 in capsicum are less sensitive to high temperature. In case of potato, variety Kufri Suriya has been developed which can be grown in the higher temperature regime. Genetic prospecting, genomics and allele mining are being attempted to develop varieties which can resist the higher temperature as well as abiotic stresses. In case of potato, complete sequencing of genome has been done which is a major breakthrough for understanding potato genes and the information will be utilized for developing designer cultivar of potato. Similarly, rootstock research has been identified to mitigate problems of abiotic stresses arising in the soil and also tolerant rootstock dogridge, which is commercially used.

Allele mining and bioprospecting in livestock has been taken up to understand the possible impact of climate change. Appropriate shelters are being designed for cattle, sheep, goats and pigs under NICRA Project to minimize the extreme effects of

climate change. In XII Plan, mission on pig, rural poultry, goat production, and feed and fodder development is being proposed.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para Nos. 1.23, 1.24 and 1.25 of Chapter – I of this Report.

### **RECOMMENDATION SERIAL NO. 2.19**

Even in such a scenario, the Committee draw consolation from the fact that atleast the Government are fully aware of what all problems the Country might face in future due to abiotic stress factors. What is now required is that the various Ministries/Departments of the Government have to put their heads together and devise strategies, both short term and long term, to take care of the problems arising out of or incidental to various abiotic stresses. Merely, passing around pressing issues or issues which may acquire pressing dimensions later on, just because of jurisdictional considerations or constraints is not going to pay any dividends on an all encompassing matter like abiotic stress resulting from climate change. The Government need to take a cue from the UN initiative of the Inter-Governmental Panel on Climate Change and form an inter-ministerial body consisting of all Ministries/Departments, who have some or the other mandate relevant to working out a holistic response and putting in place a suitable mechanism for tackling climate change, abiotic stress not excluded. DARE/ICAR being the nodal body of the National Agricultural Research System, the Committee expect them to play a more proactive role in facilitating the creation of such an inter-ministerial body for devising the strategies, working out interfaces, putting a suitable mechanism in place and finally for implementation of those strategies for consoling and or mitigating the effects of abiotic stress on the agriculture and allied sectors. The Committee would like to have a detailed Action Plan in this regard from

DARE detailing all the action that has already been taken and what all still needs to be done for fructification of the strategies, wherewithal and infrastructure for combating climate change and mitigating the resultant aggravation in abiotic stresses.

### **Reply of the Government**

The National Action Plan on Climate Change (NAPCC) under the Chairmanship of Prime Minister is already in place wherein eight missions including different sectors have been formulated. These missions have been formulated with the Inter-ministerial consultations.

The Department has identified various platforms which directly or indirectly address most of the concerns in XII Plan. This will constitute the major efforts towards adaptation to climate change including technology development for coping with climatic stresses in crops, livestock and fisheries and also demonstration of existing technologies in more than 200 vulnerable districts.

The Indian Council of Agricultural Research (ICAR) initiated a Network Project 'Impacts, Adaptation and Vulnerability of Indian Agriculture to Climate Change' in 2004 to study the impact of climate change and global warming on agricultural crops, horticulture, forests, livestock, fisheries, etc., at 15 locations which was extended to 23 locations during XI Plan. A dedicated institute National Institute on Abiotic Stress Management was established in 2009 to conduct upstream research on atmospheric, edaphic and drought stresses besides policy support research. Several other projects were also initiated by ICAR in the XI Plan under NAIP. Some of the notable projects are related to development of a single cell C<sub>4</sub> photosynthetic system in rice, shelter management for livestock, etc. Under Global Environment Facility (GEF) two projects viz, 'strategies for sustainable management of degraded coastal land and water for enhanced livelihood security of the farming communities' and 'strategies to enhance adaptive capacity to climate change in vulnerable regions' were also initiated at Central



Soil Salinity Research Institute (CSSRI), Karnal and IARI, New Delhi, respectively during September, 2009.

Under NICRA, the demonstration of available climate resilient technologies at farmers' field in 100 vulnerable districts across the country has been planned from 2011-12 onwards targeting one lakh farmers. The district level contingency plan for 209 districts was also prepared for the implementation by the States in the event of aberrant weather situations such as droughts, floods, heat and cold waves, frost, hailstorms, etc.

Under NAIP Project, allele mining is being done in camel and goats for abiotic stress. In XII Plan, mission on pig, rural poultry, goat production and feed-fodder and climate resilient livestock production is being proposed.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para Nos. 1.26 and 1.27 of Chapter – I of this Report.

### **ONGOING ENDEAVOURS RECOMMENDATION SERIAL NO. 3.32**

The Committee note with satisfaction that ICAR have taken up various crop breeding activities with a view to develop varieties that have the capability to minimize the impact of abiotic stresses. They are, however, constrained to observe that the efforts of ICAR face the twin roadblocks of lack of requisite infrastructure and facilities for these activities and availability of suitably trained human resource. In their considered opinion no research system can make any headway in the absence of state-of-the-art facilities and trained manpower to operate the systems. It is, therefore, but imperative that both these constraints are attended to with utmost urgency to enable the research and development activities continue unhindered in this frontier area of science. The Committee understand that all this can not be achieved till sufficient funds are placed at the disposal of the Department on priority basis exclusively to attend to

the requirements of men and material for the activities and endeavours being undertaken to mitigate the effect of abiotic stresses on agriculture and allied activities. From the requirements of infrastructure and facilities communicated, it is abundantly clear to them that even the Department are yet to work out a holistic and comprehensive proposal with a long term perspective. They, therefore, desire that an exercise be carried out by the Department detailing all of their specific and precise requirements in the first instance. The financial proposals incidental to these requirements be then accordingly worked out and presented to the Planning Commission and the Ministry of Finance. The Committee would like to advise the Department to complete these two activities with utmost speed not only due to the gravity of the problem to be tackled but also in view of the fact that the Twelfth Plan is being finalized and there is a greater chance of their proposals being given consideration at this stage rather than in the middle of the Plan. The Committee also recommend the Government to give a serious consideration to these proposals of DARE/ICAR for allocation of funds as these investments are of utmost relevance to ensure food safety and security in the years to come.

### **Reply of the Government**

During XI Plan the ICAR through NAIP has trained a large number of scientists from all stake-holders of NARS in the frontier areas of agricultural sciences. These scientists have been trained in the state of the art laboratories in a particular area. These scientists are being utilized as resource persons to train other scientists in the country through national trainings. The total number of scientists trained abroad are 580 and also organized 20 national trainings using many of these scientists as resource persons in these national trainings. The effort would continue during XII Plan and ICAR would like to strive that India does not lag behind in technical skills and competence in the frontier areas of agricultural sciences like nano-technology, allele mining, carbon trading, stem cell research, nutraceuticals, smart packaging, water use efficiency, etc.

Further to address shortage of suitably trained Human Resources in the area of abiotic stress mitigation in agriculture, ICAR is also sponsoring Summer Winter Schools/ short courses and Training Programmes under Centre of Advanced Faculty Training Scheme for capacity building of Scientists/ Teachers of National Agricultural Research System in emerging areas like Biotic and Abiotic Stress Management in Fruits Crops, Breeding for Biotic and Abiotic Stresses, Biotic and Abiotic Resources Management for Eco Friendly and Sustainable Agriculture, Advances in Rootstocks for overcoming Biotic and Abiotic Stresses, Nutrient-hormonal Dynamics and Photosynthetic Efficiency in Crop Plants under Abiotic Stress.

Niche Area of Excellence in the areas of Genetic Engineering for Drought Resistance and Management, Microbial Biotechnology for imparting resistance in plants against insects and pest, enhancing water and fertilizer use efficiency in arid crops have been established for research and capacity building in addressing problems associated with abiotic and biotic stresses. These programmes provide support for sustaining and augmenting the regional national and global advantage in this important area for improving quality of human resources, adequate infrastructure, access to information and interaction with best of peer groups in India and abroad.

The efforts to improve availability of training facilities in this area will be further intensified in the XII Plan by more allocations of funds and support for the desired facilities.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **RECOMMENDATION SERIAL NO.3.33**

The Committee note that the ICAR as an interim measure have made some reallocation of finances, etc. to strengthen the research on climate change and abiotic stresses. The National Network to Study on Climate Change Impacts, Adaption and Mitigation has been expanded to 23 centres during Eleventh Plan period. The

Committee while appreciating the constraints of ICAR in limiting this Programme to only 23 centres due to the obvious resource constraints desire that as this study would be the backbone of the strategies to counter the various consequences of climate change and abiotic stresses, the Department should approach the Planning Commission and the Ministry of Finance at the highest level to get additional funds released for these studies without any further delay. Thereafter, the Department should expand such studies to all of their centres and take initiatives to enhance the strength of scientists in these centres and impart them the best of training to enable them to concentrate their research on tangible, effective and economical solutions to tackle the effects of climate change and abiotic stresses with a view to work out long term strategies to ensure food safety and security of the Nation.

### **Reply of the Government**

The Network Project 'Impact, Adaptation and Vulnerability of Indian Agriculture to Climate Change' will be merged with National Initiative on Climate Resilient Agriculture (NICRA) in the 12<sup>th</sup> Plan. NICRA as such has four components viz., (i) strategic research on adaptation and mitigation, (ii) technology demonstration to cope with current climate variability in 100 vulnerable districts, (iii) capacity building and (iv) sponsored competitive research to fill critical gaps in the strategic research. This scheme is being implemented in 21 ICAR Institutes covering all aspects of agriculture i.e., food crops, horticultural crops, livestock and fisheries. The capacity building is an important component of NICRA which will involve training of young scientists in climate change research for scenario building, simulation models and quantifying GHGs emissions. Training programmes and awareness camps on climate change/climate variability and coping strategies are also planned for farmers, NGOs, SHGs, line department officials, policy makers and lead institutions (banks, insurance companies, cooperative credit societies).

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **RECOMMENDATION SERIAL NO. 3.35**

The Committee find that the National Agriculture Innovation Project to increase the productivity under abiotic stress conditions has been allocated a sum of Rs. 2.61 crore for the period 2008-09 to 2010-11. Out of this an expenditure of Rs. 2.36 crore has been incurred on the said project till date. The Committee view agriculture innovation to be a constant bedrock of the future R&D in agriculture. This area, therefore, needs to be funded adequately for well defined and cogent proposals. Accordingly, they feel that DARE need to rework on the future funds requirement for this Project and get the same released from Planning Commission with due promptitude.

#### **Reply of the Government**

A project on Bio-prospecting of genes and allele mining for abiotic stress tolerance is operating at 36 centres besides the National Research Centre on Plant Biotechnology as the Lead Centre. NAIP has sanctioned Rs. 57.13 crores for this project. The funds released to the project are Rs. 42.58 crores and utilization is to the tune of Rs. 35.92 crores as on June 30, 2011. Therefore, The ICAR has addressed the concerns raised by the Committee and the project is not facing any paucity of funds.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **RECOMMENDATION SERIAL NO. 3.36**

The Committee note that as of now Department of Agricultural Research and Education have some projects on transgenics in crops which includes abiotic stress tolerant varieties under the Network Project of Transgenic Crops (NPTC). Due to the very specialized nature of such research, there are very few ICAR Institutes who have been assigned the task of development of gene constructs and development of transgenic crop varieties for resistance to abiotic stresses. Rice, Wheat, Mustard,

Tomato, Chickpea, Groundnut and Cotton have been included for development of gene constructs and development of transgenic crop varieties for resistance of abiotic stresses. During the Tenth and Eleventh Plans, out of Rs. 95.33 crore, a sum of Rs.70.32 crore was incurred under the NPTC project. The Committee would like to caution the Department for such under utilisation of funds when avowedly there is paucity of money. They, therefore, recommend that funds allocated for the Project should be utilized in a planned manner. The Committee deliberately refrain from commenting on other aspects of transgenic crop varieties as they are separately examining the Subject 'Cultivation of Genetically Modified Food Crops – Prospects and Effects' on which they intend to Report to the Parliament shortly.

### **Reply of the Government**

The Network Project on Transgenic Crops (NPTC) has substantially progressed in the assigned tasks. The present position in regard to financial expenditure is that, out of the grants received during the current plan period of Rs. 6250 lakhs, an amount of Rs. 5921 lakhs (about 94%) has been utilized for enabling the progress of this project.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **RECOMMENDATION SERIAL NO. 4.14**

Inspite of the fact that agriculture is a State Subject and thereby the extension efforts are being primarily undertaken by the State Governments, the fact still remains that ICAR at the apex of the National Agriculture Research System (NARS) have a pivotal role in the assessment, refinement and demonstration of technology/products. For this purpose, the ICAR has a network of 61 All India Coordinated Research Projects and 17 Network Projects in the Country to take care of technology identification and dissemination/extension requirements. The State Agriculture Universities are also an integral component of the extension system and the field level dissemination of the extension services is the responsibility of Krishi Vigyan Kendras (KVKs). The first KVK

was established in Puducherry in 1974. The Committee find that their numbers, over the years, increased to 589, as on date. The Department plan to establish a total of 667 KVKs by end of the Eleventh Plan. The Committee also note that out of 589 KVKs operational now, some are under the ICAR, some under SAUs, some with the State Governments. The remaining KVKs are under PSUs, Central Universities and NGOs. As a part of the perspective planning, the Department intend to establish one additional KVK in each of the 50 larger districts keeping in view the potential of the district for agricultural growth and scope of diversification in addition to the geographical area, rural population and net sown area. The Committee appreciate this long overdue initiative of DARE/ICAR to increase the number of KVKs in the Country. Knowing fully well the state of connectivity and access of rural areas with a KVK, at district level, the Committee strongly feel that the norms of establishing a KVK need an urgent review with the intention of improving the accessibility of the farmers to them. This is their considered opinion would enhance the reach and spread of the extension services run by the KVKs. They, therefore, desire the Department to immediately get down to the task of preparing an action plan for this purpose and getting it fructified on priority as the Twelfth Plan is already on the anvil.

### **Reply of the Government**

As a standard practice, a site selection committee headed by an eminent agricultural scientist assesses the logistics available in a district for establishing a KVK keeping in view the availability of land and its location accessible to farmers. In order to select most appropriate site for setting up a KVK, need based changes in the site selection criteria have been made from time to time.

The KVKs of 100 districts of the country which are vulnerable to climate change have been given responsibility to conduct demonstrations of available climate resilient technologies at farmers' field under NICRA.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

## **Comments of the Committee**

For comments of the Committee please refer to Para Nos. 1.47 of Chapter – I of this Report.

### **RECOMMENDATION SERIAL NO. 4.15**

The Committee note with satisfaction that the extension services system of NARS has been able to transfer several technologies/equipment for demonstration as well as for actual use to suit the requirements of various categories of farmers in different agro-climatic regions for different crops. These have led to value addition of the agriculture produce and consequently the income of the farmers alongwith improving this. They have also been able to availability of breeder seeds in sufficient quantities. They further note with satisfaction that the KVKs system as a part of its goal of rendering agriculture technologies and training farmers through development and demonstration is providing e-connectivity amongst the KVKs to facilitate access to the e-enabled agricultural technologies to the KVKs and ZPDs. This also enables them to access the e-enabled agricultural technologies available on internet/websites of Agriculture Institutes and Universities, e-mailing and voice communication with other remote sites connected. The Committee desire that all KVKs should be provided e-connectivity as early as possible enabling the farmers to avail the benefits of various latest technologies related to agriculture sector.

### **Reply of the Government**

As suggested by the committee, proposal for providing e-connectivity to rest of the KVKs will be made during the XII Five Year Plan.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**



## **RECOMMENDATION SERIAL NO. 4.16**

The Nutrient Based Subsidy Scheme for fertilizers was introduced by the Government with effect from 1 April, 2010. The Committee find that DARE/ICAR as of now lack exact feedback on this Scheme as it has been implemented only recently. The Committee are, however, of the view that to effectively implement the Nutrient Based Subsidy Scheme for fertilizers, the Government would require substantial inputs from NARS on the soil health and related matters, nutrient status of soil, the agricultural practices, etc. DARE/ICAR have to, therefore, do a lot of spade work in this direction. The Committee note that DARE/ICAR have been assigned the job of having geo-reference database on major and micro nutrients created. They have already commenced work on the Project from April this year and intend to cover 170 districts by March, 2012. The geo-reference databasing will help in working out the exact fertiliser requirement of a crop in a district. The Committee, therefore, desire that this task be completed by DARE/ICAR on top priority basis in a highly time bound manner to not only attain the target of 170 districts this year is fully met within the stipulated timeline but also accomplish the geo-reference databasing of major and micro nutrients for the remaining districts at the earliest.

### **Reply of the Government**

In order to provide adequate support to the nutrient based subsidy scheme, ICAR is undertaking soil fertility mapping based on geo-referenced soil sampling for site specific and precise fertilizer recommendations. So far mapping has been completed with respect to organic carbon, major and micronutrients in 65 districts and soil sampling and laboratory analysis is in progress for another 38 districts. It is projected that mapping of 171 districts would be completed by September, 2012 and soil fertility mapping of the rest of about 430 districts would be completed in second phase of the project.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

## **RECOMMENDATION SERIAL NO. 4.18**

Having assessed the performance of the present extension system on the basis of various inputs received by them, the Committee, have a distinct feeling that the Extension Services in the Country are at present not in an optimal state of readiness to cope with the responsibilities that will enjoin upon them in view of the fast paced developments, due to climate change and global warming. The Department have also admitted as much about the deficiencies in NARS and consequently in extension services due to paucity of funds, lack of infrastructure and shortage of human resource etc. In such a scenario, it is but apparent that the challenges posed to agriculture and allied sectors, climate change and resultant abiotic stresses cannot be met upto the desired level causing avoidable distress to the farming community. Furthermore, such an eventuality also has serious implications for the food security and safety of the Country.

### **Reply of the Government**

In order to reach more number of farmers in the district, the KVKs need strengthening in terms of infrastructure and manpower. In order to tackle the challenges posed to agriculture due to climate change and resultant abiotic stresses as many as 100 KVKs, as part of NICRA project, have been given the responsibility of taking up climate issues through demonstration of climate resilient technologies in the farmers field. The thrust areas of work include promotion of drought tolerant early maturing crop varieties in rainfed crops; harvesting rainwater and supplemental irrigation during dry periods; in-situ moisture conservation in red and black soils; custom hiring centres for timely planting of dryland crops; promotion of small ruminants as livelihood enterprise in highly drought-prone areas; organization of community seed and fodder banks in remote villages, etc.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

## **RECOMMENDATION SERIAL NO. 4.19**

The NARS has now to be oriented on a two way system where technologies and products are disseminated downwards and data base and feedbacks are generated upwards from the lowest tier. In this endeavour, the KVKs because of their district level positioning and, therefore, their limitation of reach and spread cannot be the ultimate panacea. The Committee, therefore, feel that another tier below the KVKs needs to be developed under them especially under those KVKs having a wider area to cover. In their considered view, an entity at the block level called Krishi Vigyan Up-kendra, etc. can act as the terminal point for dissemination of technologies and other outputs of extension services in a more effective and time bound manner than the district level KVKs. They can also act as the generation/collection points for database and feedback not only for DARE/ICAR but for the other Ministries/Departments of the Government who have some or the other stake in agriculture, in a far comprehensive manner at the block levels. As far as funding of such block level entities is concerned, DARE can think of working out the modalities for the purpose in coordination with Department of Agriculture and Cooperation for including it as a component under Rashtriya Krishi Vikas Yojana. They desire to be apprised of the progress made in this regard.

### **Reply of the Government**

KVK is an institution mandated to assess, refine and demonstrate the technologies developed by ICAR institutes and agricultural universities in the major farming systems of a district. The results of performance of technologies and associated constraints are shared with research as feedback and with extension system to disseminate among farmers. Each KVK is provided modest infrastructure and a team of six Subject Matter Specialists only. The creation of its sub unit at block level will dilute its composite and integrated science focused structure as well as the mandated activities. However, in case of 50 larger districts one additional KVK is being set up. As far as data base development is concerned the KVKs provide technological

backstopping to district line departments for generating data and feed-back. The Department of Agriculture and Cooperation has already made provision of a Block Technology Team under ATMA scheme and KVKs provide necessary technical support to re-orient them with the advancement of technologies.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

## **CHAPTER – III**

**Observations/Recommendations which the Committee do not desire to pursue in view of the Government's reply**

**- NIL -**

## CHAPTER – IV

### **Observations/Recommendations in respect of which replies of the Government have not been accepted by the Committee**

#### **RECOMMENDATION SERIAL NO. 1.10**

Variability in weather particularly when almost 80 million hectares of land in India is rainfed poses serious ramifications on the agri-sector. The Committee observe that inspite of the declining contribution of this sector to GDP drastically over the years, agriculture continues to provide livelihood to almost 60% of our workforce. The Committee note that though abiotic stresses are as old as agriculture itself, the changing dimension due to climate change are a worrisome aspect. The growing vagaries of weather apart, abiotic stresses are also a result of depletion of water table and nutrient imbalances in soil like zinc, boron, sulphur and iron, increased salinity and alkalinity, deficiencies of nitrogen, phosphorous and sulphur, imbalanced use of fertilizers, increasing toxicities of selenium and other heavy metals, etc. The Committee realizing the emerging threats, had in their Forty Seventh Report (Fourteenth Lok Sabha) on the 'Impact of Global Climate Change on Agriculture and Allied Sectors in India' suggested several remedial measures and strategies to cope up with the situation. What has, however, dis-appointed them was that the Government, despite being forwarned of the impending threats and their likely ramifications on the agriculture sector and livelihoods of million of people has chosen to remain impervious to the gravity of the situation. The Committee had in view of the capital intensive solutions to these vexed problems recommended in their said Report that National Agriculture Research System ought to be provided sufficient funds to ensure that the Research and Development efforts are not hindered. The Committee are, however, highly perturbed to note that the Government has singularly failed to adequately fund the research efforts of our research scientists. As has been time and again brought out in previous Reports of the Committee, the allocation of Rs.12023 crore against Rs.31000 crore recommended by the Working Group for DARE for the Eleventh Plan, shows complete lack of concern of the Government towards this important aspect. They hope against

hope that the situation on this front would witness a significant improvement at least during Twelfth Plan. They would like to be apprised of the action taken and results obtain in this regard at the earliest.

### **Reply of the Government**

During the XII Five Year Plan, the ICAR is proposing to address the issues such as Natural Resources degradation, Increasing Biotic and Abiotic Pressures, Input use Efficiency, Farm Mechanization Harvest & Post Harvest Losses, Profitability in farming, Quality Human Resource and Farm Extension through establishment of Consortia Platforms in a mission mode approach. Some of the Consortia Platforms are Agri-Biodiversity Management, Genomics, Seed, Hybrids, Climate Change, Conservation Agriculture, Water and Waste Management, Health Foods, Feed & Fodder, Biofortification, Diagnostics and Vaccines, Nanotechnology, etc. Further approach will be on Productivity enhancement and Yield Gap Reduction, Extra Mural Funding, Establishment of Agri Innovation Fund, Regional Phytotron facilities, etc.

The ICAR through NAIP is addressing the issues of climate change through mitigation measures to meet productivity under rainfed agriculture. Some of the good results emerging from the projects on ground are: 1) Networking water yielding borewells in dryland areas coupled with micro-irrigation systems to ensure atleast one crop i.e., Kharif, besides providing life saving irrigation to the second crop requiring less water during rabi. The results have been successfully demonstrated in Rangareddy district of Andhra Pradesh; 2) The nano-particles of phosphorus applied through soil application enhanced yield of crops like pearl millet by 15 to 30% in the semi-arid areas like Jodhpur in Rajasthan. The results of 2 years crop have shown promise for making further effort in this direction; 3) A model of benefitting small holder through carbon finance has been demonstrated over a grid of more than 1500 ha involving 1450 farmers in the district of Warangal, Andhra Pradesh. By making a consortium of these farmers in a grid and planting timber and fruit trees, every farmer has started earning Rs. 7 to 8 thousand per year; 4) The proposals are being formed during XII Plan for

ensuring timely availability of critical inputs for land preparation, seed and fertilizers. This is one such intervention besides technology which facilitates utilizing available soil moisture during the short periods of monsoon rains.

As part of National Initiative on Climate Resilient Agriculture (NICRA) project, KVKs have taken up activities relating to the major farming systems in 100 vulnerable districts for mitigation and adaptation to climate change. The focus of work include drought tolerant and early maturing varieties in rainfed crops, sub-mergence tolerant rice varieties in frequently flood or cyclone prone districts, varieties which escape terminal heat stress in the rabi crops, moisture conservation, zero tillage practices and agro forestry interventions for rehabilitation for degraded lands etc.

This could be possible only through enhanced allocation for XII Five Year Plan out of which a major share would be identified for research for improving crop productivity in rainfed agriculture. Revamping of higher agricultural education for improving and sustaining the quality, need priority attention by extending financial support to State Agricultural University for their research and education programmes.

The Working Group on Agriculture constituted by the Planning Commission also endorses the matter. The ICAR has proposed to address this issue through enhanced allocation for 12th five year plan out of which a major share would be identified for research for improving crop productivity in rainfed agriculture.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para Nos. 1.11 and 1.12 of Chapter – I of this Report.

### **RECOMMENDATION SERIAL NO. 2.20**

Coming to the immediate task ahead for DARE/ICAR, the Committee note that the intensive agriculture in various parts of the Country has caused depletion of natural



resources such as water and nutrients, leading to lowered water table and nutrient imbalances in the production systems. The Government have so far prepared soil fertility maps of micronutrients (NPK) for only 20 States and micronutrient maps for 10 States. The Committee express their unhappiness over the tardy progress of mapping of soil fertility. Due to this, a large number of marginal and small farmers do not invest in application of micronutrients which has lead to increase in deficiencies of nutrients such as zinc, boron, sulphur and iron and also degrading environment or pollution. The Committee, therefore, urge the Department of Agricultural Research and Education to complete the mapping of soil fertility of all the remaining States in a time bound manner as this step would also contribute significantly in the strategies being evolved for tackling abiotic stresses.

### **Reply of the Government**

Keeping in view the immense importance of soil fertility mapping, the ICAR has taken initiative to prepare GIS based soil fertility mapping for macro, secondary and micronutrients at district or even block level in 21 States. The programme is being funded by Department of Agriculture & Cooperation, Ministry of Agriculture. So far mapping of 65 districts of the country has been completed by various AICRP on Soil Test Crop Response centres. These maps will be useful for monitoring of soil fertility at district/block level fertilizer recommendations and distribution of fertilizers etc. to ensure balance fertilization and thereby improving soil health and crop productivity in the country. It is projected that mapping of all the 171 districts would be completed by September, 2012 and soil fertility mapping of rest of about 430 districts would be completed in second phase of the project.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para No. 1.30 of Chapter – I of this Report.

### **RECOMMENDATION SERIAL NO. 3.37**

The Committee note that the project entitled 'Impacts, adaption and vulnerability of Indian Agriculture to climate change' with the objective of quantifying the sensitivity of crops including horticultural crops and plantations, soil, water, fish and livestock to climate changes was launched in 2004. A very important component of agriculture is soil. They, however, find that the ICAR have not undertaken any projects on soil under this project during the year 2007-08 and 2008-09. They also find that the funds allocated under the projects were not fully utilized during the year 2007-08, 2008-09 and 2009-10. They, therefore, desire the Department to improve their management of finances so that not only precious resources are fully utilized but also the timelines for various components of the Project are achieved without any cost over runs.

#### **Reply of the Government**

The research on assessing sensitivity of crop to climate change in food crops has resulted in identifying breeding materials that are less affected and are being put to use in breeding for new crop varieties.

The adaptation and mitigation through enhanced water productivity, nutrient use efficiency, and conservation agriculture and agro-forestry systems is already included under NICRA which aims at designing and development of suitable soil-water management practices for enhancing climate resilience.

The horticulture component of this project is taken up at IIHR, Bangalore and IIVR, Varanasi to identify and develop tomato, french bean, chillies etc. varieties tolerant to climatic stress (heat and water deficit) for different agro climatic regions and varying seasons in the country. In tomato, 225 lines have already been screened against heat stress and promising lines have been sorted out. The source of resistance to high

temperature in frenchbean was also identified. Thirty chilli lines were screened for water stress tolerance and four onion lines were identified to soil moisture stress.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011, Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para No. 1.40 of Chapter – I of this Report.

### **RECOMMENDATION SERIAL NO. 3.38**

The Committee appreciate that different crop management practices including Contingency Planning are being worked out by the Department by monitoring of the status of crops situations. 575 Districts have been targeted for the Contingency Plans and out of this 102 Plans have been completed and 257 Plans are under preparation. The Committee, however, note that 102 districts in which the Contingency Plan have been completed present a very lop-sided picture and a large number of States are not being attended to at the requisite pace. Thus, a large number of districts in States like Madhya Pradesh, Himachal Pradesh, Jammu and Kashmir, Uttar Pradesh, Bihar, Chhattisgarh, Jharkhand and Assam are yet to be taken up by the Government for District Contingency Planning. The Committee, therefore, recommend that the Government to take up these activities in a uniform manner so that all the States can avail the benefit of Contingency Plan simultaneously. The Committee also recommend that the preparations of Plans in the remaining 216 Districts be completed by the Government at the earliest. They would like to be apprised of the progress made in this regard at the earliest.

### **Reply of the Government**

The contingency plans for 209 districts have been completed so far. These include 22 in Andhra Pradesh, 23 in Gujarat, 19 in Haryana, 24 in Karnataka, 14 in

Kerala, 21 in Maharashtra, 27 in Orissa, 19 in Punjab, 9 in Rajasthan and 31 in Tamil Nadu. By March 2012, district plans will be completed for a total of 350 districts and remaining districts in the other states will be completed on priority.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para No. 1.43 of Chapter – I of this Report.

### **RECOMMENDATION SERIAL NO. 4.17**

Keeping the farmers constantly updated on weather information can play a major role in improving the agriculture production in the Country. The matter has already been touched upon by the Committee in the previous Chapter of this Report. The Committee find that there are very few Kisan Vikas Kendras in which weather stations have so far been established by the Indian Meteorological Department. The Committee, therefore, recommend the Department of Agricultural Research and Education to take up the issue of setting up of weather stations/automatic weather stations with the Indian Meteorological Department so that all the KVKs are provided with agromet observatory and are in a position to provide farmers weather updates timely and in the event of any natural calamities enable them to take a pre-emptive course of action to save their precious produce from falling prey to the fury of nature.

### **Reply of the Government**

Appreciating the need for Agro Advisories for the farming community, the ICAR has so far set up the weather stations/automatic weather stations at 270 centres at SAUs and plans to set up another 100 such stations in KVKs in 100 vulnerable districts under National Initiative on Climate Resilient Agriculture (NICRA).

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para No. 1.46 of Chapter – I of this Report.

## **CHAPTER – V**

### **Observations/Recommendations in respect of which final replies of the Government are still awaited**

#### **RECOMMENDATION SERIAL NO. 2.17**

The Committee note with a sense of trepidation the continued havoc caused by abiotic stresses to the agriculture and allied sector produce of the Country. The abiotic stresses alone as also in tandem with other factors like input supply deficiencies, agro-climatic conditions, biotic stresses, etc. continue to be a major worry for the farming community and the agriculture scientists alike since till date effective solutions for tackling them are not readily available. The extensive loss caused to food grain production by the droughts, which are abiotic stresses, during 1987 and 2002 are well documented. As admitted by the Department the cold waves, which are also a form of abiotic stress caused substantial damage to mustard, mango, guava, papaya, brinjal, tomato and potato crops during 2002. In like manner the heat stress in 2004 in the Indo-Gangetic Plains led to the wheat crop maturing earlier by 10-20 days. The Committee further note that as compared to these staggering losses during the 2009 drought, loss of food grain production was prevented to a certain extent. This happened because ICAR took several pro-active measures. These include compiling all the available research information including varietal and emergent strategies on contingency plans for facing anticipated eventualities. The efforts of ICAR were also ably supplemented by weather forecasting of agro-advisories in local languages by the State Agriculture Universities. According to the Committee, the example drought mitigation efforts of 2009 can be a trend setter for the future strategies for tackling calamities caused by abiotic stresses. The Committee, however, feel that apart from the need of institutionalizing a coordinated multi-agency, multi-disciplinary strategy a lot needs to be done on the research and development front by the ICAR.

## **Reply of the Government**

In order to mitigate the anticipated abiotic and biotic stress in crop production, frontier science-based research to exploit explored genetic systems for being introgressed into crops is proposed in the next plan period.

Efforts are being made to develop second generation technologies with the help of biotechnological tools to cope up with the climate change induced abiotic stresses and drought-proofing. A National Institute on Abiotic Stress Management has been established in Baramati, Pune to conduct upstream multi-disciplinary research with state-of the art infrastructure. CRIDA, CAZRI, CSSRI and CSWCRTI are also strengthening their research on drought proofing and water harvesting. Efforts are being made to strengthen the agroforestry component research in watershed management based agricultural production mechanism.

The ICAR is developing designer varieties to combat heat tolerance, drought tolerance and other abiotic stresses in different crops in near future. Root-stock research using dogridge in grapes has given varieties resistant to heat tolerance. Apart from this efforts are being made to develop heat tolerance varieties in chillies, tomato, French beans and pea varieties.

The efforts of ICAR for improvisation in forewarning of weather conditions as well as release of necessary agro-advisories to farmers in local languages is being relooked. Enhanced efficiency for prompt advisories through Information and Communication Technology (ICT) to reach each Panchayat could sensitize the access to the relevant knowledge for farmers.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

## **Comments of the Committee**

For comments of the Committee please refer to Para No. 1.17 of Chapter – I of this Report.

### **RECOMMENDATION SERIAL NO. 3.34**

With regard to bio-prospecting of genes and allele mining for abiotic stress tolerance it transpires that a project with an approved allocation of Rs. 57.13 crore was started in 2009-10. However only Rs. 32.10 crore was sanctioned in 2009-10 of which Rs. 16.03 crore only has been released for the project. The Committee are of the firm opinion that starving this Scheme of funds in the initial stages will hamper the research activities in this vital field. They, therefore, recommend that funds once sanctioned for such pivotal projects should be released in time in the future so as to ensure that research is carried on uninterruptedly and is unaffected in any manner by paucity of funds.

### **Reply of the Government**

The NAIP funded project on “Bioprospecting of genes and allele mining for abiotic stress tolerance” is in operation at 36 different centres with NRC on Plant Biotechnology as the lead centre. By June 2011 a total of Rs.4258.874 lakhs have been released of which Rs.3592.427 lakhs have been spent so far (84.35% utilization). The rest amount out of the total sanctioned budget of Rs. 5713.243 lakhs is released in the year 2011-12 so that all the activities are carried out and all the projected objectives are met.

The project has already made significant progress with regard to generation of resource base for gene prospecting in all the target species including moth bean, lathyrus, goat, camel, fish species in which very little information was available. Many stress responsive genes have been cloned and some of them are being functionally



validated. While most of the objectives will be met during the project period of three months by March 2012, some aspects would require extension of the project period by another one and a half year in view of the fact that the traits being handled are of complex nature and many of the species from which genes are being prospected have not been worked out earlier, which demand more time and efforts.

Further studies are aimed on chilli, tomato, capsicum, onion and peas and on several cucumis species at IIHR, Bangalore and IIVR, Varanasi, and also to initiate same studies on potato at CPRI, Shimla and at IISR, Calicut on spices. Forty two genotypes of cucumber and 48 genotypes of musk melon at IIHR and 16 genotypes of cucumber and 19 genotypes of musk melon were screened at IIVR against water stress. In due course of time, ICAR may be able to solve the problem of abiotic stress tolerance in various horticultural crops.

**[Vide Ministry of Agriculture O.M. No. 7(10)/2011, dated 29<sup>th</sup> November, 2011,  
Department of Agricultural Research and Education]**

### **Comments of the Committee**

For comments of the Committee please refer to Para No. 1.35 of Chapter – I of this Report.

**NEW DELHI;  
29 August, 2013  
07 Bhadrapada, 1935 (Saka)**

**BASUDEB ACHARIA  
Chairman,  
Committee on Agriculture.**

**COMMITTEE ON AGRICULTURE  
(2012-13)**

**MINUTES OF THE THIRTY NINTH SITTING OF THE COMMITTEE**

The Committee sat on Thursday, the 29<sup>th</sup> August, 2013 from 1000 hours to 1040 hours in Committee Room 'E', Parliament House Annexe, New Delhi.

**PRESENT**

**Shri Basudeb Acharia - Chairman**

**MEMBERS**

**LOK SABHA**

2. Shri Narayansingh Amlabe
3. Smt. Ashwamedh Devi
4. Shri P. Kumar
5. Dr. Jyoti Mirdha
6. Shri Devji M. Patel
7. Shri Rajaiah Siricilla
8. Shri Hukamdeo Narayan Yadav

**RAJYA SABHA**

09. Shri Parshottam Khodabhai Rupala
10. Shri S. Thangavelu

**SECRETARIAT**

1. Shri R.S. Kambo - Joint Secretary
2. Shri P.C. Koul - Director
3. Shri C. Vanlalruata - Deputy Secretary

2. At the outset the Chairman welcomed the members to the Sitting of the Committee. The Committee, thereafter, took up the following draft Reports for consideration:

- (i) Fiftieth Report on action taken by the Government on the Observations/Recommendations contained in the Twenty-sixth Report of the Committee on Agriculture (2010-11) on “Development of Abiotic Stress Resistant Crop Varieties and Dissemination of Production Enhancing Technologies Review of R&D and Extension Efforts in the Country” ; and

\*(ii)   xxxx           xxxx           xxxx           xxxx           xxxx  
          xxxx           xxxx           xxxx           xxxx           xxxx

3. After some deliberations, the Committee adopted the draft Fiftieth Report without any modifications and \*xxxx xxxx xxxx xxxx. They also authorized the Chairman to finalise the above Draft Report(s) in the light of the factual verifications got done by the concerned Departments of the Ministry of Agriculture and present them to the Parliament.

***The Committee then adjourned.***

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\* Matters not related to this Report.

## ANNEXURE

(Vide Para 4 of Introduction of the Report)  
ANALYSIS OF ACTION TAKEN BY GOVERNMENT ON  
THE TWENTY-SIXTH REPORT OF COMMITTEE ON AGRICULTURE ON  
DEVELOPMENT OF ABIOTIC STRESS RESISTANT CROP VARIETIES AND  
DISSEMINATION OF PRODUCTION ENHANCING TECHNOLOGIES REVIEW OF  
R&D AND EXTENSION EFFORTS IN THE COUNTRY

(i)	Total number of Recommendations	21
(ii)	Recommendations/Observations which have been Accepted by the Government	
	Para Nos. 1.9, 1.11, 1.12, 2.18, 2.19, 3.32, 3.33, 3.35, 3.36, 4.14, 4.15, 4.16, 4.18 and 4.19	
	Total	14
	Percentage	66.66%
(iii)	Recommendations/Observations which the Committee Do not desire to pursue in view of the Government's replies	
	Total	NIL
	Percentage	0%
(iv)	Recommendations/Observations in respect of which replies of the Government have not been accepted by the Committee	
	Para Nos. 1.10, 2.20, 3.37, 3.38 and 4.17	
	Total	05
	Percentage	23.80%
(v)	Recommendations/Observations in respect of which Final replies of the Government are still awaited	
	Para Nos. 2.17 and 3.34	02
	Total	NIL
	Percentage	09.52%