**O.I.H.**

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION

**LOK SABHA**
**UNSTARRED QUESTION NO. 2622**
TO BE ANSWERED ON 10/05/2016

## CLIMATE SMART AGRICULTURE

2622. SHRI VIJAY KUMAR HANSDAK:
SHRI BHARAT SINGH:
SHRI NAGAR RODMAL:
SHRI K.C. VENUGOPAL:
SHRI PR. SENTHIL NATHAN:

Will the Minister of AGRICULTURE AND FARMERS WELFARE कृषि और किसान कल्याण मंत्री be pleased to state:

(a) whether the Government is aware of international and national reports warning that climate change, global warming and current policies could lead to acute food scarcity by 2020, if so, the details thereof and the steps taken in this regard;

(b) whether the Government is aware that the climate change in the country is clearly discernible for quite some time and resulting in adverse effects on agriculture and food security, if so, the details thereof and the reaction of the Government thereto;

(c) whether the Government has made any assessment of the impact of climate change on small scale agricultural system in the country, if so, the details thereof;

(d) whether the agriculture sector is currently responsible for 10-12 per cent of global anthropogenic green house gas emissions and if so, the details thereof and the action taken by the Government to encourage the farmers to adopt low carbon farm technique to boost the agricultural production in the country; and

(e) whether the Government has taken any concrete steps to encourage climate smart agriculture and to reduce the dangers posed by climate change on agriculture and food security in the country and if so, the details and the achievements thereof?

## A N S W E R

MINISTER OF STATE IN THE MINISTRY OF AGRICULTURE AND FARMERS WELFARE
कृषि और किसान कल्याण मंत्रालय में राज्य मंत्री
**(DR. SANJEEV KUMAR BALYAN)**

(a) Yes, Madam. Government is aware of important international and national reports of Inter-governmental Panel on Climate Change (IPCC 2013 and 2014), UK-Met Office (2012), FAO (2016), World Bank (2013), ICAR-Network Project on Climate Change (NPCC, 2004-10), and Indian Network of Climate Change Assessment (INCCA, 2010)

besides National Communication to UNFCCC (2012) on climate change, global warming, current policies and their impact on Indian agriculture leading to possible food scarcity by 2020. Most studies indicate reduction in yield of crops especially rice, wheat, maize, sorghum due to heat extremes and reduced availability of irrigation water.

Recognizing likely impact of climate change on agriculture and allied sectors, Government through Indian Council of Agricultural Research (ICAR) has initiated network project, National Innovations on Climate Resilient Agriculture (NICRA) during 2010-11. It encompasses multi-pronged strategic research, technology development, capacity building of stakeholders and technology demonstrations at farmers' fields.

(b) Yes, Madam. Some recent studies hint at an increasing frequency and intensity of extremes in rainfall and rise in temperature during past 40-50 years resulting in adverse effects on agriculture. Further, decline in wheat yield in Eastern and Central India due to terminal heat stress and unseasonal windy rainfall during February-March; damage to horticultural crops such as mango, guava, papaya, brinjal, tomato, potato due to cold waves; damage to horticultural crops due to hailstorms in Maharashtra, upward shift in apple production zones in the Himachal Pradesh etc. have been experienced in recent past. Such anomalous weather and climate events in various regions could have been influenced due to global warming and long-term climate change besides natural variability of climate system would result in adverse effects on agriculture and food security. However, from the available meteorological data in the country, it is difficult to draw a definite relationship between climate change and extreme weather events experienced in the recent past.

The ICAR institutes and SAUs in collaboration with IMD provide the weather forecast and crop contingency plans across India. So far, contingency plans for 614 districts covering 25 states have been prepared and uploaded at www.farmer.gov.in, www.crida.in and www.agricoop.nic.in. The contingency plans are also being constantly updated to meet the emerging situations.

Further, Government recently launched Pradhan Mantri Fasal Bima Yojana (PMFBY) for providing financial support to farmers suffering crop damage from unforeseen events and production risks. The details of PMFBY are available at www.agricoop.nic.in.

(c) Research studies indicate more erratic and intense monsoon rains/unseasonal rains and hailstorm, increasing risk of droughts and floods and rise in temperature including increased frequency of warm days in certain pockets and affecting small scale agricultural system. This may leads to projected average reduction of yield by 6% in wheat, 4-6% in rice, 18% in maize, 2.5% in sorghum, 2% in mustard and 2.5% in potato. The crop yield were projected more vulnerable in Central and East India for wheat; Punjab, Haryana, and Rajasthan for irrigated rice, Maharashtra, Odisha, Chhattisgarh and Assam for rainfed rice; Central India for mustard and Punjab, Bihar, Jharkhand, Uttar Pradesh and West Bengal for potato.

The impact of climate change is also expected in economic viability and production of livestock systems through poor availability of quality feed and fodder, decreased reproductive performance and decline in milk production. Further, ICAR- CRIDA has also mapped 572 districts of the country for their vulnerability to extreme events due to climate

change. The vulnerability was assessed high to very high in 230 districts, medium in 114 districts and low to very low in 228 districts. The details are placed in **Annexure-I**.

(d) Globally, agriculture contributes about 10-12% of total GHG emissions. However, Indian agriculture sector contributes about 18% of the total greenhouse gas (GHG) emissions in the country. Important activities of agriculture which contribute to emissions include livestock (56% mainly as methane), rice cultivation (18% as methane) and burning of crop residues (2%) and manure management (1%).

The Government has taken several initiatives to reduce GHG emissions and improve agricultural productivity through promoting rice cultivation under System of Rice Intensification (SRI) and Direct Seeded Rice (DSR), Neem coated urea, judicious use of water and fertilizers, water saving technologies and shifting area from transplanted rice to other cereals, pulses and oilseeds especially in Punjab, Haryana and western Uttar Pradesh. Further, location and crop specific efficient management practices for conservation agriculture (CA), resource conservation technology (RCT), broad bed furrow (BBF) method of sowing, micro irrigation have been developed by ICAR institutes which reduce GHG emission from crops and have been demonstrated through Front Line Demonstrations (FLD).

(e) Government through Indian Council of Agricultural Research (ICAR) has initiated network project called National Innovations on Climate Resilient Agriculture (NICRA) during 2010-11 for enhancing resilience of Indian agriculture to climate change through strategic research, capacity building and technology demonstration. Under Technology demonstration component (TDC) of NICRA, the climate resilient interventions are implemented by taking one representative village in 151 vulnerable districts. Major interventions implemented under the scheme for climate resilient agriculture include efficient management of natural resources, adoption of resilient agronomic practices, adoption of stress tolerant varieties, efficient management of livestock, poultry and fisheries and strengthening local institutions.

Government is also addressing the issues of climate change through National Mission on Sustainable Agriculture (NMSA). The NMSA as pragmatic intervention aims at adopting location specific, integrated/ composite farming system; soil and moisture conservation measures; comprehensive soil health management, efficient water management practices and mainstream rainfed technologies. Besides, climate resilient interventions have been embedded and mainstreamed into Missions/Programmes/Schemes of Department of Agriculture & Farmers Welfare (DAC & FW) through a process of restructuring and convergence.

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**Annexure-I**

[Part (c) to Lok Sabha USQ No.2622 for 10-05-2016]

Table: District-wise Vulnerability Indices to Climate Change

| State | Vulnerability Indices to Climate Change | | | | |
|---|---|---|---|---|---|
| | **Very High** | **High** | **Medium** | **Low** | **Very Low** |
| A & N Islands | | | | | A & N Islands. |
| Andhra Pradesh | Chittoor, Anantapur. | Kurnool. | Cuddapah, | Prakasam. | Guntur, Srikakulam, Visakhapatnam, Nellore, East Godavari, Vizianagaram, West Godavari, Krishna. |
| Arunachal Pradesh | | | | Tawang, East Kameng, Upper Subansiri, West Siang, Upper Siang. | West Kameng, Dibang valley, Tirap, Lower Subansiri, Lohit, Changlang, Kurung Kumey, Papum Pare, East Siang. |
| Assam | Karbi-Anglong. | Barpeta | N C Hills. | Hailakandi, Dhemaji, Nalbari, Kamrup, Dhubri, Morigaon , Golaghat. | Karimganj, Nagaon, Kokrajhar, Goalpara, Bongaigaon, Lakhimpur, Sonitpur, Dibrugarh, Tinsukia, Jorhat, Sibsagar, Cachar, Darrang. |
| Bihar | Kishanganj, Madhubani, Araria, Darbhanga, Supaul, Bhagalpur. | Gopalganj, Saran, Purnea, Saharsa, Siwan, Katihar, Patna, Buxar, Sitamarhi, Nalanda, Champaran(East), Champaran(West), Samastipur, Muzafarpur, Vaishali. | Begusarai, Lakhisarai, Jahanabad, Banka, Bhojpur, Jamui, Madhepura. | Sheikhpura, Aurangabad, Khagaria, Sivhar, Rohtas, Bhabhua (Kaimur). | Gaya, Nawadha, Monghyr. |
| Chhattisgarh | | Kawardha, Sarguja, Rajnandgaon, Koriya, Dantewara, Jashpur, Durg. | Mahasamund, Bilaspur, Bastar, Kanker. | Korba, Raigadh, Janjgir, Raipur, Dhamtari. | |
| Dadra & Nagar Haveli | | | | | Dadra & Nagar Haveli. |
| Daman & Diu | Daman & Diu | | | | |
| Goa | | | | | Goa |
| Gujarat | Patan, Amreli, Surendranagar, Kutch, Banaskantha, Mehsana, Ahmedabad, Bhavnagar, Rajkot, Jamnagar, Junagadh, Sabarkanta, Panchmahal, Porbandar. | Gandhinagar, Dahod, Dang, Bharuch, Vadodara, Narmada. | Kheda. | Anand. | Surat, Valasad, Navsari. |

| State | Vulnerability Indices to Climate Change | | | | |
|---|---|---|---|---|---|
| | Very High | High | Medium | Low | Very Low |
| Haryana | | Kaithal, Fatehabad, Jhajjar, Sirsa, Bhiwani, Panipet, Jind, Hissar, Mahendragarh. | Kurukshetra, Faridabad, Gurgaon, Rewari, Karnal, Sonipet. | Rohtak, Panchkula. | Ambala, Yamunanagar. |
| Himachal Pradesh | | Kullu, Shimla, Chamba, Bilaspur. | Kinnaur,Hamirpur. | Mandi, Una, Kangra. | Sirmaur, Solan, Lahaul & Spiti. |
| Jammu & Kashmir | | Rajouri. | Doda, Udhampur, Pulwama, Budgam, Poonch, Anantnag. | Srinagar, Kathua, Kupwara. | Kargil, Leh(Ladakh), Baramulla, Jammu. |
| Jharkhand | Godda, Pakur, Sahibganj. | Bokaro, Gumla, West Singbhum, Lohardaga, East Singbhum, Palamu. | Giridish, Dumka, Garhwa, Chtra, Ranchi, Dhanbad, Deoghar. | Hazaribag, Koderma. | |
| Karnataka | Bijapur, Gulbarga, Gadag, Bagalkot, Raichur, Chitradurga, Haveri, Bidar, Davanagere, Bangalore (Rural), Tumkur, Koppal, Dharwad, Chamarajanagar. | Kolar, Bellary, Belgaum, Mysore, Mandya. | | Bangalore (Urban), Hassan. | Chikmagalur, Uttara Kannada, Kodagu / Coorgu, Udupi, Dakshina Kannada, Shimoga. |
| Kerala | | | Thiruvanathapuram, Malappuram, Kollam, Kozhikode. | Wayanad, Kasaragod, Kannur, Kottayam, Alappuzha, Idukki, Palakkad. | Thrissur, Pathanamthitta, Ernakulam. |
| Madhya Pradesh | Jhabua, Rajgarh, Mandsaur, Shajapur, Dindori, Ratlam, Dhar, Sidhi, Vidisha, Shivpuri, Ujjain, Bhind, Barwani, Shahdol, | Rewa, MandlaDewas, Neemuch, Khargone(West Nimar), Betul, Guna, Sehore, Umaria, Damoh, Panna, Satna, Chhatarpur, Datia, Chhindwara, Katni. | Seoni, Morena, Sheopur Kalan, Raisen, Bhopal, Khandwa(East Nimar), Tikamgarh, Indore, Sagar. | Narsinghpur, Jabalpur, Gwalior, Harda. | Balaghat, Hoshangabad. |
| Maharashtra | Solapur, Beed, Ahmednagar, Osmanabad, Latur, Nandurbar, Sangli,Buldhana, Dhule, Nasik, Jalna, Amravati. | Akola, Aurangabad, Jalgaon, Parbhani, Washim. | Nanded, Pune, Hingoli. | Yavatmal, Wardha, Satara, Nagpur, Raigad, Thane. | Gondia, Ratnagiri, Gadchiroli, Bhandara, Sindhudurg, Kolhapur,Chandrapur. |
| Manipur | | | Churachandpur, Chandel, Ukhrul. | Senapati, Tamenglong, Imphal East. | Imphal West, Thoubal, Bishnupur. |

| State | Vulnerability Indices to Climate Change | | | | |
|---|---|---|---|---|---|
| | Very High | High | Medium | Low | Very Low |
| Meghalaya | | | South Garo Hills. | West Garo Hills, East Garo Hills, West Khasi Hills. | Jaintia Hills, East Khasi Hills, Ri-Bhoi. |
| Mizoram | | | Champhai. | Saiha, Lawngtlai, Mamit, Serchhip, Lunglei, Kolasib, Aizawl. | |
| Nagaland | | | | Mon, Tuensang, Wokha. | Phek, Zunheboto, Kohima, Mokokchung, Dimapur. |
| Odisha | | Nuapada. | Kalahandi, Bolangir, Phulbani (Kandhamal), Keonjhar, Gajapati, Nabarangpur, Puri, Mayurbhanj, Kendrapara. | Sundargarh, Koraput, Malkangiri, Deogarh, Bhadrak, Sonepur, Jagatsingpur, Baragarh, Dhenkanal, Nayagarh, Rayagada, Jharsuguda, Balasore (Baleshwar), Sambalpur | Boudh, Jajpur, Angul, Ganjam, Khurda, Cuttack. |
| Pondicherry | | | | | Pondicherry |
| Punjab | Faridkot, | Moga, Kapurthala, Mansa, Firozpur. | Sangrur, Muktsar, Bathinda, Jalandhar. | Fathegarh Sahib, Shahid Bhagat Singh Nagar, Patiala, Hoshiarpur, Amritsar, Ludhiana. | Rupnagar, Gurdaspur. |
| Rajasthan | Barmer, Jaisalmer, Jodhpur, Bikaner, Nagaur, Jalore, Churu, Pali, Tonk, Ajmer, Sirohi, Dungarpur, Sikar, Rajsamand, Banswara, Hanumangarh, Bhilwara, Jhunjhunu, Jaipur, Sawai Madhopur, Udaipur, Jhalawar, Chittorgarh, Dausa, Bharatpur. | Sri Ganganagar, Bundi, Dholpur, Alwar, Karauli, Baran. | Kota. | | |
| Sikkim | | | | Sikkim-South, Sikkim-North. | West-Sikkim, East-Sikkim. |

| State | Vulnerability Indices to Climate Change | | | | |
|---|---|---|---|---|---|
| | **Very High** | **High** | **Medium** | **Low** | **Very Low** |
| Tamil Nadu | Perambalur, Ariyalur, Salem, Namakkal, Dharmapuri, Ramanathapuram, | Villupuram, Thiruvannamalai, Karur, Thiruvarur, Dindigul. | Thanjavur, Coimbatore, Vellore, Cuddalore, Erode, Thoothukudi, Madurai, Nagapattinam, Thiruchirappalli. | Kanyakumari, Pudukkottai, Theni, Sivagangai. | The Nilgiris, Virudhunagar, Thirunelveli, Thiruvallur, Kancheepuram. |
| Telangana | | Mahabubnagar, | Medak, Adilabad. | | Rangareddy, Karimnagar, Warangal, Nizamabad, Khammam, Nalgonda, |
| Tripura | | | | | Dhalai, South Tripura, North Tripura, West Tripura. |
| Uttar Pradesh | Mahoba, Chitrakut, Banda, Hamirpur, Ballia, Bahraich, Kaushambi, Mathura, Deoria, Shravasti, Jhansi, Siddharth Nagar, | Bagpat, Lalitpur, Budaun, Gonda, Balrampur, Mau, Ghazipur, Sonbhadra, Fatehpur, Raebareily, Basti, Kushinagar, Shahjahanpur, Jalaun, Agra, Jaunpur, Faizabad, Maharajganj. | Mirzapur, Hardoi, Kanpur (Dehat), Aligarh, Sant Ravidas Nagar, Pratapgarh, Sant Kabir Nagar, Hathras, Farrukhabad, Azamgarh, Allahabad, Muzaffarnagar, Unnao, Jyotiba Phulenagar, Gorakhpur, Varanasi, Etah, Saharanpur, Auraiya, Kannauj, Bareilly, Sitapur, Ambedkar Nagar, Sultanpur | Etawah, Kheri, Firozabad, Bijnor, Pilibhit, Barabanki, Mainpuri, Gautam Buddh Nagar, Kanpur City, Bulandshahar, Chandauli, Lucknow, Moradabad, Rampur. | Ghaziabad, Meerut. |
| Uttarakhand | Bageshwar, Tehri Garwal, Chamoli, | Almora, Pithoragarh, Champawat, Rudraprayag. | Uttarkashi | Pauri Garhwal. | Haridwar, Dehardun, Nainital, Udham Singh Nagar. |
| West Bengal | Malda | | Purulia, Dinajpur (Uttar), Murshidabad, Nadia, Dinajpur (Dakshin), 24-Paraganas (South), Howrah, Cooch Behar. | 24-Paraganas (North), Midnapore, Birbhum. | Jalpaiguri, Darjeeling, Hooghly, Bankura, Burdwan. |

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