

ICAR-Central Research Institute for Dryland Agriculture
Santoshnagar, Hyderabad-500059

Date: 28.11.2019

Answer to the Lok Sabha Q Dy. No. 2307

1. Question: Whether any studies have been conducted to understand the effects on climate change on the agriculture sector in India and if so, the details thereof

Answer: Yes.

- A recent study by ICAR-CRIDA on effect of rise in minimum temperature over India on agricultural production revealed that Annual mean minimum temperature showed warming @ 0.24° per decade (10 years) on all India basis. The magnitude of rise in seasonal mean temperatures is more during rabi (0.28 °C 10 yr⁻¹) compared to *kharif* (0.19 °C per decade). *kharif* paddy yields in 268 districts across the country (57.2% of paddy growing area) were influenced by a rise in minimum temperature. Decline in kharif paddy yield ranged between 411 and 859 kg ha⁻¹ per 1 °C rise in minimum temperature across regions.
- Another study by ICAR-CRIDA on sensitivity of wheat yields to temperature in India revealed that Indian wheat yields were observed to be prone to heat stress and especially to short-term temperature extremes. Mean wheat yields for the period 1980–2011 declined by 7% (204 kg ha⁻¹) for each 1°C rise in minimum temperature.
- Pathak et al. (2003) observed that the negative trends in solar radiation and an increase in minimum temperature, resulting in declining trends of potential yields of rice and wheat in the Indo-Gangetic plains of India. The study by Fischer et al. (2002) indicate a probability of 10-40% loss in Indian food grain production due to the increase in temperature by 2080-2100

If not the reasons therefore; Not applicable

2. Question: Whether any research have been commissioned by the government to link the predictions regarding climate change with studies of agriculture productions systems in the country to suggest suitable options for the sustaining agriculture production in future and if so, the details thereof

Answer: Yes.

The findings from the Climate Change impact assessment of the ICAR-NPCC network project are as follows;

Rice: Irrigated rice yields are projected to reduce by -4% in 2020, 7% in 2050 and by -10% in 2080 scenarios. On the other hand, rainfed rice yields in India are projected reduced by -6% in 2020 scenario, but in 2050 and 2080 scenarios they are projected to decrease only

marginally (<2.5%). Adopting improved varieties and input management can improve the yields by 6-17% in irrigated condition and by about 20-35% in rainfed condition.

Wheat: Climate change is projected to reduce the timely sown irrigated wheat production by about 6% in 2020 scenario from existing levels, however, late and very late sown wheat yields are projected to decrease by about 18% in 2020, 23% in 2050 and 25% in 2080 scenarios if no adaptation is followed. However, adaptation by sowing improved varieties coupled with improved agronomic management can improve the yields by about 10% in 2020 (2010-2040) scenario.

Maize: Climate change is projected to reduce the irrigated kharif maize yields by up to 18% in 2020 scenario, if no adaptation is followed. However, adapting to climate change by adoption of technologies such as improved varieties and agronomical management can improve the yields by about 21% in 2020 scenario. Climate change in 2050 and 2080 scenarios is projected to reduce the irrigated kharif maize yields by 18 to 23% and the adaptation is projected to improve the yields by about 10% in 2050 and by 4% in 2080 scenario.

Sorghum: Rainfed sorghum yields, on all India scale, are projected to marginally (2.5%) decline in 2020 scenario while it is projected to decline by about 8% in 2050 scenario. Adaptation strategies such as improved and tolerant variety managed under improved input efficiency with additional nitrogen fertilizer can enhance the irrigated maize net production by about 21% in 2020, 10% in 2050 and 4% in 2080 scenarios.

Soybean: Likely increase in kharif soybean yield in the range of 8-13% under different future climate scenarios (2030 and 2080) is predicted.

Groundnut: Kharif groundnut yields are projected to increase by 4-7% in 2020 and 2050 scenarios where as in 2080 scenario the yield is likely to decline by 5%.

Chickpea: Future climates are likely to benefit Chickpea by an average increase in productivity ranging from 23 to 54%. However, a large spatial variability for magnitude of change in the productivity is projected.

Potato: Climate change may likely to benefit potato in Punjab, Haryana and western and central UP by of 3.46 to 7.11% increase in production in A1b 2030 scenario, but in West Bengal and southern plateau region, potato production may likely to decline by 4 - 16% by 2030.

Apple: In Himachal Pradesh, consequent to warming and reduction in chilling temperatures, Apple cultivation has shifted to higher elevations.

Controlled environmental studies: whereas controlled environmental studies under elevated CO₂ up to 550 ppm indicated a positive response to pulse crops like chickpea, soybean, Greengram and vegetables like onion and tomato and non-edible oil seeds like castor.

Question: Whether any programs have been implemented to provide farmers with the relevant information and advise them on farming practice that will help them account for changing climate and weather patterns; and

If so the details thereof

Answer: Yes

- AICRPAM under ICAR-CRIDA has initiated to disseminate Agromet Advisory Services (AAS) at block-level through all its 25 cooperating centers and Krishi Vigyan Kendras (KVK) of the respective districts and such advisories are now designated as micro-level AAS. The micro-level AAS is disseminated by multiple communication modes, viz., mobile text as well as voice SMS, display at public places, personal contact etc. The feedback obtained from the farmers is being evaluated for improving as well as expanding services for the benefit of farming community. Farmer's awareness programs are also been conducted by 25 AICRPAM centres under AICRPAM-NICRA project.
- The Agromet Advisory Bulletins are issued by IMD at district, state and national levels. The district level bulletins are issued by AMFUs (Agro Meteorological Field Units) and include crop specific advisories including field crops, horticultural crops and livestock. The State Level bulletin jointly prepared by State Meteorological Centre of IMD and AMFUs is a composite of district bulletins helping to identify the distressed districts of the state as well as plan the supply of appropriate farm inputs such as seeds, irrigation water, fertilizer, pesticides etc. It forms a significant input to the State level weekly Crop Weather Watch Group (CWWG) meeting and used by state government line function departments viz: Fertilizer industry, Pesticide industry, Irrigation Department, Seed Corporation, Transport and other organizations which provide inputs in agriculture. National Agromet Advisory Bulletins are prepared by National Agromet Advisory Service Centre, Division of Agriculture Meteorology, IMD, Pune, using inputs from various states.
- Under Gramin Krishi Mausam Sewa project (GKMS), India Meteorological Department, Ministry of Earth Science in collaboration with State Agricultural Universities /Indian Council of Agricultural Research etc. is issuing crop and location specific weather based agro advisories for farming community for coping with the occurrence of extreme and changing weather pattern