

## **CRIDA : HYDERABAD**

**Answer to the provisionally admitted priority unstarred question for the Lok Sabha - D.No. 4549**

**a) Whether the government has conducted any study / survey regarding adverse impact of global warming on agriculture which has manifested unusual trends such as erratic rainfall, shrinking forest cover, rising temperature and increasing food insecurity in the country;**

- Extensive field and simulation studies were carried out in agriculture and allied sectors by the 23 network centers consisting ICAR Institutes.
- The Indian Network for Climate Change Assessment (INCCA) of the Ministry of Environment & Forests, has studied the climate change impact assessment in the North-Eastern states

**b) if so the details and findings of the study thereof; along with the regions identified as most vulnerable to climate change / global warming in the country, state wise;**

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 CO<sub>2</sub> upto 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.

### **Points from the INCAA-2010 study on North- Eastern Region on CC Impacts**

- **Rainfall:** The projected mean annual rainfall is varying from a minimum of 940±149mm to 1330 ±174.5 mm. The increase with respect to 1970's is by 0.3% to 3%. The north-east also show a substantial decrease in rainfall in the winter months of January and February in 2030's with respect to 1970's with no additional rain projected to be available during the period March to May and October to December. In fact, recent data indicates the same pattern. However, the monsoon rainfall during June, July and August is likely to increase by 5 mm in 2030's with reference to 1970's a rise of 0.6% observed.
- **Temperature:** Surface air temperature is projected to rise by 25.8 to 26.8 °C in 2030's with a standard deviation ranging from 0.8 to 0.9. The rise in temperature with respect to 1970's is ranging from 1.8 to 2.1 °C.

- **Agriculture:** Simulation analysis indicates that the climate change may bring change in the irrigated rice yields by about –10% to 5%, while the impacts on rain-fed rice are likely to be in the range of –35% to 5% in A1B 2030 climate scenarios in NE regions. In the case of wheat, the yields are projected to reduce by up to 20%. Potato yields are likely to be marginally benefited up to 5% in upper parts of NE region due to climate change influence, but in the central part, the yields are projected to reduce by about 4% while in the southern parts of NE region, the negative impacts will be much higher. Maize crop yields are projected to reduce by about 40% in NE region. Maize and mustard are also likely to experience decrease in productivity in the entire region