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Reply to Lok Sabha Unstarred Question No.5526 regarding "Climate Change and Crop Production".

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(a) Whether the Government is aware of any study that reveals the impact of climate change on crop production;

Yes, the impact of climate change is being witnessed on crop production. Clear indications of change in climate are being noticed in the country. Last three decades saw a sharp rise in all India mean temperature and frequency of extreme rainfall events. Analysis of 100 years weather data showed increasing trend in max T (1.0°C), min T (0.18°C) and mean T (0.60°C). Daily rainfall observations showed a significant positive trend (6% per decade) in the frequency of extreme rainfall events (>100 mm per day). There has been a significant fluctuation in production (as compared to trend) in important crops grown in the country during last 9 years (between 2010-11 and 2018-19). Rice production reduced slightly in drought years 2014 (105.5 mt.) and 2015 (104.4 mt.). Wheat, maize and groundnut production suffered an adverse impact in drought year 2014 (86.5, 9.2 and 7.4 mt, respectively) and 2015 (92.3, 8.1 and 6.7 mt, respectively). Rapeseed and mustard (6.3 and 6.8 mt, respectively) and chickpea (2.8 and 2.6 mt, respectively) also registered decline in production in those drought years (2014 & 2015).

(b) If so, the details thereof along with the details of crops identified which are less sensitive to climate variations; and

Indian Council of Agricultural Research (ICAR), Ministry of Agriculture and Farmers Welfare, Government of India has launched a flagship network project National Innovations in Climate Resilient Agriculture (NICRA). Under NICRA, studies on the impact of climate change on production of crops has revealed the following observations.

Climate change is projected to reduce rainfed rice yields in India marginally (<2.5%) in 2050 and 2080 scenarios. On the other hand, irrigated rice yields are projected to reduce by 7% in 2050 and by 10% in 2080 scenarios. Climate change is projected to reduce wheat yield by 6-25% towards the end of the century with significant spatio-temporal variations. Yields of maize cultivated in monsoon season can reduce mostly in southern plateau (up to 35%), yields of maize will reduce in mid indo-gangetic plains (up to 55%), while in upper indo-gangetic plains yield is relatively unaffected. Climate change in 2050 and 2080 scenarios is projected to reduce the irrigated *kharif* maize yields by 18 to 23%. 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. The predictions of future climate scenarios (2030 and 2080) revealed that *kharif* soybean yield is likely to increase by 8-13%. *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%. Future climates are likely to benefit chickpea by an average increase in productivity ranging from 23 to 54%. 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.

(c) Whether the researchers have mapped the relationship between annual variation in temperature and rainfall in the country and if so, the details of thereof?

No. However in a study by Subash and Sikka, 2014 reveals that annual maximum temperature showed an increasing trend in all the homogenous temperature regions and corresponding annual rainfall also followed the same pattern in all the regions, except in North East.