development of maize plant at three temperature
660 ppm) CO_2 concentration to the baseline (330
ce in yield, biomass, grain number and LAI was
effect of elevated temperature and CO_2. Results
accelerated plant phenology, reducing dry matter
0 per cent. Elevation of CO_2 in the level of 440,
d increment of 2.01, 3.92 and 5.37 per cent under
and 7.41 per cent under irrigated conditions,
yield at all the temperature rise situation and
nass reduction due to temperature rise up to 1°C.

el temperature rise, elevated CO_2, maize

rimary concerns for humanity in the 21st century.
nate Change (IPCC) Fourth Assessment Report
ence that human activities have influenced the
d a half (IPCC, 2007). Global atmospheric carbon
ed that it will increase between 540 and 970 µmol
ntice *et al*., 2001). Recent projections have also
rature may increase 1.4-5.8°C in association with
entration (Cubasch*et al*., 2001).According to the
Climate Change (IPCC), global mean temperature

r through proper adaptation methodology.Recent

al warming beyond a certain limit may be serious

97).

nge such as higher atmospheric CO_2 concentration erature have different effects on plant production $_2$concentration increases plant production because ir stimulates photosynthesis. Simultaneously, the partially closing the stomata, which leads to the E) (Dhakhwa*et al*., 1997; Leakey *et al*., 2009). e leaf assimilation (Wolf and van Diepen, 1995) n *et al*., 1995; Brown and Rosenberg, 1997). ion stimulates evapotranspiration, the yields may s if the water supply is at its critical level. Rising ving season of agriculture crops by allowing the e season and crop maturity to reach earlier (Porter ological, biochemical and physiological processes corching of aerial plant parts, leaf abscission and xide concentration and temperature are likely to

interest to quantify the interactions of these two

considerable potential in agriculture research, and the exploration of management and policy pting to current and future climate change (Boote understand functioning of crops and agricultural teractions between crops and their environment *al*., 2002).The decision support system for s developed to operationalize this approach and s. The DSSAT helps decision-makers by reducing for analyzing complex alternative decisions (Tsuji

to assess the impact of important components of nd solar radiation on the productivity of maize by ted with use of weather series representing the ig 1).

el experiments used in climate change impact

AL AND METHOD

nducted during Kharif seasons of 2018 to 2020 at he geographical location of which is 32^0 59' North n elevation of 867 meters above MSL. The annual ur during June to September. July receives highest by August 210.5 mm. A solar radiation receipt is lowed by December (13.3 Wm^{-2}). The maximum ay (22.8 Wm^{-2}). The mean monthly maximum n January to 38.5^0C in June while minimum anuary to 25.3^0C in July and thereafter decreases e soil was sandy loam in texture with 67% sand, isture retention capacity.

of the crop, temperature and solar radiation.

a mechanistic process- based model, which teps. The input data required for the simulations iven in terms of genetic coefficients), (ii) field latitude), (iii) soil characterstics (texture, bulk eeding, seedling population, row spacing, planting e irrigation and fertilization), (vi) series of daily adiation, maximum and minimum air temperature

ated and validated with the data obtained from for three year (2004-06) with baseline climate and and irrigated conditions.

area were collected from the observatory of Main Campus Chatha, SKUAST-J, Jammu for a is includes maximum and minimum temperature, rated crop coefficients of the maize crop and soil xed at 330 ppm. The model simulations were run nd 660 ppm), temperature (1, 3 and 5^{0}C) and solar to present scenario.

owing dates set to 10th June, corresponding to the owing date corresponds with traditional crop effects of temperature, solar radiation and CO_2-ction, expressed as the relative changes in yields tic variables, are presented as percentage changes variables from the baseline.

AND DISCUSSION

d a general tendency towards diminishing future d (Table 1). The yield reduction of maize crop quent reduction in LAI (1 to 60 percent), biomass ed temperatures decrease the reproductive period

hing their potential size by accelerating a maize

5). High temperature caused significantly declines

e and net assimilation rate in maize, though leaf

nd Hafeez,2004).

ed gradual yield enhancement (Table 1). The 4.40, 12.75 and 17.43 percent under rainfed 58 and 22.28 percent under irrigated conditions J m^{-2} day^{-1} of solar radiation, respectively. The der irrigated conditions as compared to rainfed LAI, biomass and grain number showed the same ates the leaf assimilation (Wolf and van Diepen, Iaytin *et al.*, 1995; Brown and Rosenberg, 1997). ion stimulates evapotranspiration, the yields may if the water supply is at its critical level

sponses viz. enhanced rates of photosynthesis and
r photosynthesis allows greater carbon gain and stomatal conductance leads to lower transpiration h can delay the water deficit (Leakey *et al.*, 2009). ciency of maize causing increased growth.

rise in temperature

rowth parameters clearly indicates that the decline compensated through doubling the CO_2 level to at different temperature rise scenarios (Table 2). d reduction due to the temperature rise up to 1^{0}C. completely mitigate the adverse effect of rising d following rise in temperature up to 3^{0}C coupled 27.44 percent in rainfed and irrigated condition, at the negative effects on crop yields of warmer vere stronger than the positive effects of elevated ber decreased similarly as biomass and yield does.

atmospheric CO_2, temperature and solar radiation. anced growth and yield of maize crop but the ased or even nullified with rise in temperature.

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**rature, solar radiation and CO_2 concentration
ar *var*. Kanchan.**

% Change		
AI	**Biomass**	**Grain no.**
.06	-4.93	-5.06
8.99	-33.31	-27.92
9.57	-62.76	-52.16
.04	-5.48	-5.50
0.21	-34.47	-29.80
0.42	-63.33	-53.33
42	4.00	4.40
11	10.30	12.78
72	13.88	17.26
61	4.41	4.68

oubling CO_2 concentration (660 ppm) and rise
growth of maize.

	% Change	
AI	Biomass	Grain no.
36	3.23	1.08
8.56	-16.94	-21.78
4.39	-50.00	-54.55
26	1.41	0.90
8.54	-23.20	-20.78
1.70	-55.50	-45.90

se in temperature and solar radiation on crop

	% Change	
LAI	Biomass	Grain no.