Air and soil temperature pattern in crop canopy of tomato varieties across the different dates of sowing

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SUMMARY

A field experiment was conducted during the winter season at Horticulture Research Farm, IGAU, Raipur to find out the air temperature and soil temperature analysis in tomato crop canopy. To provide different thermal environment, the crop was sown in different dates starting from last week of September to second week of November, five tomato varieties *viz* NS-815, Punjab Chhauhara, Pusa Early Dwarf, Pusa Ruby and Punjab Kesri were sown on 15th September (D_1), 10th October (D_2), 25th October (D_3) and 10th November (D_4). Average maximum and minimum temperature were higher in D_1 during early stage of tomato crop as compared to D_3 and D_4. But it increased drastically during maturity stage *i.e.* first picking to last picking across the sowing dates. In variety NS-815 average maximum temperature was 28.1°C D_1, 29.8°C in D_2 33°C in D_3 and 35.6°C in D_4, whereas average minimum temperature was 10.7°C in D_1, 13.2°C in D_2,15.2°C in D_3 and 16.7° C in D_4 similar trend found in other varieties too. Under delayed sowing condition crop faced severe winter condition in initial stages but later at maturity temperature increased drastically. It is clear that tomato crop under Raipur condition, faces thermal stress. If sowing is delayed indicate impact on number of fruit pant^{-1} and fruit wet pant^{-1} is seen. This indicates that D_1 ideal sowing for NS-815 and the other verities of tomato hybrid NS-815 proved superior over the four variety in term of yield. The soil temperature both at 5 cm and 10 cm depth were higher in D_4 sown crop as compared to D_1, D_2 and D_3 sown crop. There was increase in temperature in afternoon hours at later part of crop across sowing dates. There was clear cut change in the morning and afternoon hour temperature in D_1 to D_3 while in D_4 difference between morning hour and afternoon hour soil temperature was not much.

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Vegetable is an indispensable part of the vegetarian human diet. India is the second largest vegetable producer of tomato in world. Tomato (*Lycopersicon esculantum* Mill) is one of the most important industrial vegetable crop because of its outstanding processing qualities. It is good source of vitamins and minerals. It is also consider as a medicinal plant as the pulp and juice are easily digestible, a promoter of gastric section, blood purifier and an important antiseptic too. The growth and development of any crop including tomato is influenced by three major regimes *viz*. moisture, thermal and light regimes, under irrigated condition the influence of moisture is nullified, the light regime influences its growth while the thermal regime influences the developmental activities in a crop. In the latitude belt of 18–22° N the winter span is less and temperature fluctuation is also very high. As a result of thermal stress, tomato crop during *rabi* season is often affected by temperature fluctuations in Chhattisgarh state. Thermal stress during *rabi* season reduces the duration of each developmental stage and there by the productivity. In Raipur, vegetable like tomato is widely grown in *rabi* season and production is utilized by fruit processing industries to export tomato pulp. However, due to short span of winter in Raipur, the temperature shoot up in February on wards. As a result the productivity, quantity and weight of fruit decreases abruptly. Taking in to consideration the present experiment was conducted.

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MATERIALS AND METHODS

The field experiment was conducted at the Research Farm of Indira Gandhi Agricultural University, Raipur (C.G.) at 21.16° N Lat. 81.36°E long. and 289.56 m. altitude, during *rabi* season of 2001- 2002 on tomato genotypes *viz*. NS-815 (Hybrid), Punjab chhauhara, Pusa early dwarf, Pusa ruby and Punjab kesri under different thermal environments *viz*. 25th September (D_1), 10th October (D_2), 25th October (D_3) and 10th November (D_4).

The main plot treatmentent considered of four date of sowing D_1, D_2, D_3, D_4 and sub plot treatments included five genotypes of tomato crops *viz*. NS-815 , Punjab Chhauhara,