

# Studies on different thermal regimes and thermal sensitivity analysis of tomato genotypes

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## SUMMARY

The effects of different thermal regimes on yield attributes and yield of tomato genotypes sown at four different dates were studied and thermal sensitivity analysis of the same was worked out. The temperature tolerance of the tomato genotypes has been worked out on the basis of crop duration under four different thermal environments by using Thermal Sensitivity Index. The tomato genotypes at different sowing dates were evaluated on the basis of TSI and it was observed that NS-815 was moderately tolerant whereas Punjab chhauhara, Pusa earl dwarf, Pusa ruby and Punjab kesri were moderately susceptible to thermal stress. It was observed that D<sub>1</sub> (25<sup>th</sup> September) sowing recorded higher yield at average maximum 30°C temperature and minimum 12°C temperature. Whereas average maximum 35°C temperature and minimum temperature 16°C temperature during maturity period led to 50 % decrease in yield per plant<sup>-1</sup> and yield ha<sup>-1</sup> in D<sub>4</sub> (10<sup>th</sup> November sowing). Thus the average increase in temperature by 5°C caused 50 % reduction in yield of tomato crop.

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Thermal regimes, Thermal sensitivity, Index, Tomato, Genotypes.

In Chattisgarh plains, a large number of progressive farmers grow vegetables in *rabi* season that follows rice crop. Tomato is important usually planted in the 3<sup>rd</sup> week of October. Vegetable of this region and when fields are occupied by rice crop, tomato planting is possible in the 3<sup>rd</sup> week of November.

Tomato processing *i.e.* conversion of tomato into pulp for export is a major industry in this region. But due to the short span of winter particularly in Raipur, the atmospheric temperature shoots up February onwards causing a drastic reduction in tomato production and hence hampers the tomato supply to these units. Thus, the increasing temperature reduces the duration of each developmental stage of the crop. Hence it is necessary to develop a yard stick or a measuring unit to assess the thermal sensitivity of tomato crop.

The growth and development of any crop including tomato is influenced by three major regimes *viz.* moisture, thermal and light regime. Under irrigated conditions the influence of moisture nullified. The thermal regime influences the developmental activities while light regime influences the growth of the crop. In the latitude belt of 18-22°N the winter span is less and temperature fluctuations are very high, as a result of this thermal stress, the

production potential of the crop is adversely affected in the state.

The short span of winter in Raipur that causes a thermal stress during *rabi* season reduces the duration of developmental stage and thereby the crop productivity. Besides this, the quality (size, and shape of fruit) and fruit weight decreases abruptly. In view of this an experiment was conducted to study the influence of different thermal regimes on different tomato genotypes and to assess the thermal sensitivity of the crop.

## MATERIALS AND METHODS

A field experiment was conducted during *rabi* season of 2001-2002 at the Research Farm of Indira Gandhi Agricultural University, Raipur (C.G.) on tomato genotypes. The climate of the region was sub-humid type and varied from moist sub humid to semi arid with an annual rainfall of 1280 mm. Five tomato varieties were selected for the experiment of which one was hybrid. Four different planting dates were aimed at providing different thermal environments to tomato plants during various developmental stages *i.e.* from fertilization to maturity. The details regarding the main plot treatments and sub plot treatments are discussed below.

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