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**Abstract:** The success or failure in sustainability of crop production depends on local weather and climatic conditions and year-to-year variations within a region. One means of alleviating climatically induced stress is through modifications of microclimate which include any artificially introduced changes in the composition, behavior or dynamics of the atmosphere near the ground so as to improve the environment in which crops grow. In other words, microclimate modification is an intended change in the soil-plant- atmosphere system, which alleviates stress or prevents damage with the aim of attaining improved yields. Modifications of microclimate are intended to bring about changes in one or more of the meteorological parameters. Partial control of the microclimatic conditions, which have a major influence on plant growth characteristics, can be achieved in glasshouses or polygreenhouses. Greenhouses are the framed or inflated structures covered with transparent or translucent and shade net materials large enough to grow crops under partial or fully controlled environmental conditions to get optimum growth and productivity. These poly-greenhouse structures have provided a new scope for commercial application of high value crops. The present investigation was carried out to study the performance of Tomato (cv:Allrounder) under both polyhouse and open condition with different plastic mulches. This experiment was conducted at field of the department of agricultural engineering, Birsa Agricultural University, Kanke, Ranchi during the period from December 2012 to May 2013. Daily relative humidity, temperature and solar radiation were recorded inside the polyhouse and in an open field at 7am and 2pm. Maximum and minimum thermometers recorded the measurement of air temperature and dry and wet bulb thermometers recorded the measurement of relative humidity. Lux meter recorded light intensity. Daily soil temperature was also recorded inside the polyhouse and in an open environment at 7am and 2pm at 5cm depth by soil thermometer. Leaf temperature was recorded inside the polyhouse and outside polyhouse at 15days interval by using the Infra red thermometer. Vegetative growth parameters like plant height, no of branches, internodes and leaf area index of the three randomly selected tagged plants were measured at 15 days interval. Air temperature inside the polyhouse was distinctly higher than the open field condition from December to March and after March air temperature at outside was found higher. Relative humidity showed a reverse trend with respect to temperature under both environmental conditions. The light intensity inside the greenhouse was always lower (30 – 50%) than the open field. Like air temperature, soil temperature also maintained a distinct diurnal course. Soil under polyhouse always maintained 2- 5oC lower temperature as compared to the open field irrespective of the growing periods of the crop. Among the mulches, soil temperature was recorded higher under transparent mulch followed by silver black mulch under both conditions. It was found that height of the plants, number of nodes, internodal length, average fruit weight, yield per plant and total production were higher inside the greenhouse than in the open field. Open field crop was earlier in first flowering, (29 days), compared to polyhouse (31 days). Poly house and open field crops recorded total number of 7 and 6 harvests respectively. Highest yield of 22.2 kg/plot and 376 fruits/ plot were obtained inside the polyhouse under black mulch. Large fruit size inside the greenhouse was responsible for higher yield. The fruit yield inside the greenhouse was nearly two times more than in the open field condition. Polyhouse has been found to be a good alternative to have minor alterations under microclimatic conditions for achieving almost double yield of tomato compared to open field. Among the mulches, black and silver black mulches, have been found to bring about the desired conditions both within the polyhouse as well as open conditions. When farmers are not able to grow tomato under polyhouse conditions application of these two mulches would be advantageous even under open conditions.

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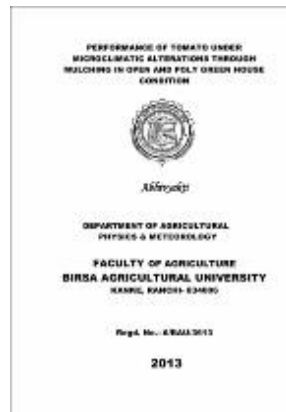
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