I. INTRODUCTION

Tomato (Lycopersicon esculentum Mill) is one of the most important vegetables extensively cultivated in the Indo-gangatic plains of India and different parts of the hills. It is basically thermo-periodic plant and favourable temperature conditions are 15 - 20°C for its better growth and production.

U.P. hills like other parts of the Himalayas, provide wide range of climatic conditions from deep irrigated valleys to higher rainfed hills for the successful tomato cultivation, round the year. This wide range of variability gives a scope to the cultivators to produce seasonal tomato in deep low irrigated valleys and "off-season" tomato in temperate higher unirrigated hills.

Tomato is a photo-insensitive crop and the photo-period does not have direct effect on the fruit-set. Unlike plains, the maturity period and yield of tomato vary considerably from location to location depending upon the period of bright sunshine, face and directions, distance from snow line, temperature and other microclimatic factors.

Two important factors i.e. yield and earliness are of foremost consideration before Horticulturists, while recommending any tomato variety for the hills. At present sufficient data are also not available on the basis of which definite maturity period and yield may be predicted with the
back ground of different locations in higher hills keeping into consideration the variation in light intensity, duration of bright sunshine and several other micro-climatic factors and thus indiscriminate recommendations are given to tomato growers. These flat recommendations to tomato growers of hills, not only put them on economic loss, but lose their trust on the improved scientific know-how and latest agro-technology.

The present studies were proposed with the background of variations in factors governing micro-climatic conditions such as light intensity, duration of bright sunshine, temperature, relative humidity etc and critically correlate factors with growth behaviour, maturity period, yield and other quantitative and qualitative characters. This type of findings will give a clear cut guide line to tomato growers to select an appropriate variety or varieties and suitable location with matching time to improve their crop. This is particularly very important to those farmers who grow "off-season" crops and few days differences in the maturity period is bound to affect their cost-benefit-ratio significantly.

The relations of various concentrations of plant growth regulators viz., 2,4-Dichlorophenoxyacetic acid (2,4-D) and Gibberellic acid (GA) have also been included besides locational studies to find out the effectiveness and usefulness of these chemicals. Efforts to improve the fruit-set, yield and quality of tomato under unfavourable Tarai conditions were made by Mehta (1973) and Kumar (1974) by using different concentrations of GA and 2,4-D. They noted significant increase
in fruit-set and total yield by the use of plant growth regulators. These plant growth regulators if create advantageous effects such as earliness, increase in fruit yield, seed yield and other quantitative and qualitative characters in the hills, then the recommendations of these chemicals will have an additional advantage for the growers while selecting the location for tomato cultivation. This forms to be an important aspect of these studies.

The present investigations were taken up at Hill Campus, Ranichauri, District Tehri-Garhwal in U.P. hills, which is situated between 1500 to 2200 m above mean sea level (amsl) and most suitable for growing "Off-season" tomato crop. Off-season tomatoes start giving fruits as early as late July or early August till late September or even early October. This is the period when seasonal tomato of plains is completely out of the market and tomato growers of hills get higher price of their produce on the basis of well known principle of demand and supply.

Two varieties of different groups, Pusa Ruby (indeterminate) and H.S.-101 (determinate) and two locations of short and long duration of sunshine were selected for the present studies with the following main objectives:

1) To find out the maturity period of tomato at two locations,

2) To find out the effectiveness of plant growth regulators in relation to locations for growth, yield and quality of tomato; and

3) To study the effectiveness of locations and plant growth regulators on the seed yield and germination.