



chapter-1

INTRODUCTION



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Vegetable production has been one of the most important branch of Horticulture. Vegetables are one of the main component of human nutrition and a good source of farm income. Normally vegetables crops give higher yield per unit area and time as compared to most of the cereal crops. Most of these are short duration crops thus, enabling farmers to take a more number of crops per year from a given area of land or they play a vital role in increasing the cropping intensity.

India is the second largest producer of vegetables in the world (ranks next to China) and accounts for 15% of the world's vegetables production. The current production is over 91 million tonnes from an area of 6.2 million hectares, which is about 3% of the total area under cultivation in the country. However, the per capital vegetable consumption in India is only about 140 g, which is far below the minimum dietary requirement of 280 g/day/person. Therefore, production of vegetables has to be increased considerably to mitigate chronic malnutrition prevalent particularly among children and women of predominantly vegetarian Indian population.

Vegetable crops are very important in our daily diet. We could improve both our diet and economic position by growing more vegetables and using them in required quantity throughout the year. Vegetables are considered as "Protective supplementary food" as they contain large quantities of minerals, vitamins and essential amino acids, which are required for normal functioning of our body for

growth, reproduction and maintenance of health.

Tomato (*Lycopersicon esculentum* Mill) is a member of Solanaceae family and genus *Lycopersicon*. The genus includes 12 species, all native of South America. It is developed from an ovary and botanically, it is classified as a fruit although, it is commercially recognized and treated as vegetable. It is a climacteric fruit in which ripening is accompanied by an increase in the rate of respiration and ethylene production. Tomato plant is characterized by two types of plant (i) Determinate type-inflorescence occurs more frequently in almost every internodes and main axis terminates with a flower cluster. (ii) Indeterminate type-inflorescence cluster occurs at every third internodes and the growth of main axis continues indefinitely. Its fruit is a true berry. It is a self-pollinated crop but in some cases as high as 30 % cross-pollination has been reported.

Tomato is one of the most common, popular and principal vegetable crops grown in India and other parts of the world. It can be grown in almost all parts of the country except higher altitudes, all the year round. In India, according to FAO estimates, tomato is grown in 0.25 million ha., its production is 7.4 million tonnes and productivity is 15.18 t/ha (The Hindu Survey of Indian Agriculture 2004). Andhra Pradesh ranks first in the area and production of tomato, whereas, Karnataka and Assam rank first in the productivity i.e. 25 tonnes/ha (Indian Horticulture Data Base NHB, 2000). The national average yield of tomato (17.7 tonnes/ha) remained more or less static over the past few years, while the increase in average yield is an urgent need to fulfill the demand of our increasing population.

The nutritive value of tomato fruit is on an average contains moisture 93.1 g, protein 1.9 g, Fat 0.1 g, Minerals 0.6 g, Fibre 0.7 g, Carbohydrates 3.6 g, Sodium 45.8 mg, Potassium 114 mg, Sulphur 24 mg, Chlorine 38 mg, Vitamin A 320 I.U., Thiamine 0.07 mg, Riboflavin 0.01 mg, Vitamin C 31mg, Calcium 20 mg, Magnesium 15mg, Oxalic acid 2mg, Phosphorus 36mg, Iron 1.8 mg of the food value per 100 g of edible portion.

Tomato is also rich in medicinal value. The pulp and juice are digestive, mild aperients, a promoter of gastric secretion and blood purifier. It is also considered to be an intestinal antiseptic. It is said to be useful in cancer of the mouth, sore mouth etc. Dried tomato juice retains vitamin C. It stimulates torpid liver and is good in chronic dyspepsia. It is one of the richest vegetables, which keeps our stomach and intestine in good condition.

At present, excessive and nonjudicial use of chemicals, fertilizers, pesticides and fungicides is responsible for deterioration of soil health and ultimately our green planet. In India, most of the farmers are small and marginal. Therefore, it is very difficult for them to purchase the chemical fertilizer in large quantities that too at high cost. Bio-fertilizer are eco-friendly and cheap source of nutrient. There is no harmful effect on soil pH and soil microflora as with chemical fertilizer. Soil fertility, water holding capacity is also improved due to increase in organic mater content with bio-fertilizer. However, it has been observed that the crop response to bio-fertilizer is not as spectacular as with chemical fertilizers. Therefore, if they are used in association with chemical

fertilizers, the expected yield per unit area may be much higher. The use of bio-fertilizer has currently attained a special significance in crop production to address the sustainability problem and tremendous success has been achieved in several economic crops.

Two bio-fertilizers of microbial origin, i.e. Azotobacter and Azospirillum as a source of Nitrogen and Phosphobacteria for Phosphorus are the most potential biological systems. For more rational agricultural programme, the economical and eco-friendly use of these nitrogenous and phosphates bio-fertilizers has now become an important issue. Most researches conducted elsewhere suggested that the use of these three bio-fertilizers could provide enough of N_2 and P_2O_5 to enhance growth and yield of various crops, thereby, saving substantial quantity of chemical fertilizers being used. Horticultural crops are likely to benefit the most from bio-fertilizer inoculation as the production practices of these high ^{value} volume crops are readily amenable to inoculation, and vegetable crops like tomato will form a good condition for bio-fertilizers inoculation due to the very nature of their root morphology.

A little work has been done on the application of bio-fertilizers in the agro-climatic conditions of Western plain zone specially Meerut region of western U.P. for improving the growth and yield of tomato.

Keeping the above facts in view, the present investigation entitled "Effect of bio-fertilizers on the growth, yield and quality of tomato was undertaken

at Horticulture Research Farm, Deptt. Of Horticulture, Ch. Charan Singh University, Meerut (U.P.) with the following objectives:-

- To assess the potentiality and feasibility of different bio-fertilizers for increasing the growth, yield and quality of tomato.
- To study the effect of various levels of Nitrogen and Phosphorus on growth, yield and quality of tomato.
- To ascertain the role of bio-fertilizers in combination with different levels of Nitrogen and Phosphorus for improving growth, yield and quality of tomato.