GENERAL INTRODUCTION

Tomato is one of the most widely used vegetable and fruit crops. Throughout India persons belonging to almost all groups of income use tomato fruits in some form or the other. The fruits are known to be very rich in various components of vitamins and other substances of great nutritional importance. However, this very important crop suffers from huge losses incurred on account of various fungal diseases, in different parts of this country. Choudhary (1968) reported about 13.96 to 26.62 percent loss of tomato fruits due to fungal diseases from local market and field surveys of Jabalpur. Chenulu and Thakur (1968) estimated about 19.32 percent loss from Delhi. Sagar is also very important centre of fruits and vegetable crops and tomato is one of the most commonly grown vegetable crop of this area. Though no accurate estimate of losses incurred in this crop at Sagar is available, however, on the basis of frequent surveys of local fields and vegetables markets it may be said that the losses could be about 15% of the total produce.

A number of fungal species have been reported to attack the tomato fruits, some of which cause
considerable damage. Amongst the important fungal pathogens which cause fruit rots are - *Alternaria solani, Alternaria tenuis, Gossypia lactis, Colletotrichum dematium, Gladosporium fulyum, Fusarium roseum, Myrothecium rosidum, Curvularia sp.* and *Rhizoctonia sp.* (Shrivastava and Tandon 1966).

The frequent surveys of local fields and fruits and vegetable markets of Sagar, during the last three years, have revealed that tomato fruits are most commonly damaged by fruit rot caused by *A. solani* and *A. tenuis*.

In the last few decades the general listing of the pathogens and also the study of general ethological processes have been completed. These studies, however, do not cover the various bio-chemical processes involved in pathogenesis. There are comparatively later development and data is now, beginning to accumulate as the techniques are being perfected.

In recent years the studies of the physiological and biochemical processes that occur in the infected plants are in the forefront of research in plant pathology. Pathologists are now devoting major efforts to learn about, what happens during the development of disease in plants. In case of rot-producing organisms it has been often found that rotting primarily involves in break down of the host cell wall by enzymes of the pathogen, so that cells are separated and the integrity of the tissue is lost. As pointed out by Dimond (1971) the understanding of these processes is not merely to satisfy curiosity but the information
so gained must be used to develop more effective control measures.

With respect to the enzymological studies the concept of regulation of enzyme activity by controlling the production and activity of enzymes involved in pathogenesis by various effector substances is gaining a great momentum. Possibilities of using this type of information have already been examined in certain cases. For example, in case of *Fusarium oxysporum* f. *lycopersici*, the synthesis of PG was found to be repressed by glucose and by the introduction of this sugar into the exposed vascular bundles of infected tomato plants, the subsequent development of disease symptoms were reduced, even though the presence of this sugar resulted in an increase in the amount of culturable mycelium in stem. It is, therefore, hoped that such enzymological studies might prove very useful to improve manipulative control of fungal diseases of plants.

Keeping these ideas and background in mind the present study on physiological and bio-chemical investigations of tomato fruit rot caused by *A. solani* and *A. tenuis* has been carried out following the format given below.

**PART - I**

**GENERAL**

This part includes the description of the host, the
pathogens, and the diseased fruits. Some of the experimental studies such as isolation of the pathogens, pathogenicity experiments, inoculation experiments, effect of temperature on the disease development as well as on the radial growth of the pathogens, effects of relative humidity; age of the culture and age of the fruit on the disease development have also been included here.

PART II
PATHOGENESIS

This consists of a detailed investigation of pectolytic and cellulolytic enzymes of the pathogens, their production under variable cultural conditions in vitro as well as in vivo. Factors affecting the production and activity of pectolytic and cellulolytic enzymes in culture have been studied. Besides this, to understand the bio-chemical alterations as a result of post infection changes, the composition of sugars, amino acids, organic acids and phenolic substances in healthy and diseased tomato fruits infected with A. solani and A. tanus, was also analysed by chromatographic techniques.

PART III
CONTROL MEASURES

In this part the effects of certain fungicides and phenolic substances on the rotting of tomato fruits have been investigated.
PART IV

MISCELLANEOUS

This part contains General Summary and conclusions, bibliography and photographs.