Chapter 6

SUMMARY AND CONCLUSIONS

There are several diseases that can reduce the yield and market of carrots but most of them are reported on the post harvested material. In living conditions whatever diseases were reported these are minor. In roots there are no much remarkable diseases which are caused by general pathogenic fungi prior to harvesting of the crop. Therefore it is interesting to know the defence mechanism of the carrot plant against the fungal pathogens. To study the defence mechanism this crop therefore was selected in the present work.

In the first part the study of carrot rhizosphere microbes is made in terms of the bacterial population and fungal colonization. These microbes were isolated and purified and treated with the fresh carrot plants in the soil and the disease severity was measured.

For this two carrot varieties were obtained from the local market of Ambajogai. The varieties used were, maharani 31 and Kohinoor 11. The five species of fungi were obtained from ARI, Pune and IMTECH, Chandigarh. These were *Rhizoctonia solani*, *Alternaria alternata*, *Fusarium oxysporum* and *Ceratocystis fimbriata*.

In order to see the response of the carrot cultivar these were grown at different soil amendments such as vermicompost, farmyard manure (FYM) and biofertilizers. No remarkable changes in the growth were found.

To study the association of fungi and the bacteria associated with the carrot roots, rhizosphere study was done where fungal colonies were found increased, however, there
was decrease in bacterial colonies which might be due to the inhibitory effects of the carrot root exudates against the rhizosphere bacteria. The fungi thus selected were continued for further experimentation.

The treatment of the fungi was given to the potted carrot plants which were irrigated regularly. The fungi showed variable effect on the growth of carrot plants. No carrot plant was survived due to the infection of *Rhizoctonia solani*. Height of the plants, number of leaves as well as biomass of the plants was found reduced due to the fungal infection in case of remaining three fungal species i.e. *Alternaria alternata*, *Fusarium oxysporum* and *Ceratocystis fimbriata*.

To identify the phytoalexins produced by the carrot root after infection of pathogens, the gas chromatography and mass spectrometry (GCMS) analysis of the extract of the treated carrot roots was carried out. In variety Maharani 31, there were total 9 compounds detected due to the treatment of *Alternaria alternata*. Due to the treatment of *Fusarium oxysporum* total 9 compounds were detected. In case of Kohinoor 11 variety there were 16 compounds detected due to the treatment of *Alternaria alternata* while in case of treatment of the *Fusarium oxysporum* there were 9 compounds detected. Their synonyms, molecular formulae and molecular weights were determined. The gas chromatogram as well as the mass spectral analysis of these compounds was also carried out.

On the basis of these observations it was concluded that the complex compounds are synthesized in the carrot roots due to the infection of the pathogens, *Alternaria alternata*, *Fusarium oxysporum* and *Ceratocystis fimbriata* which are known as
phytoalexins. The phytoalexins were found diversified as per the fungal treatment and the variety of the carrot.