Chapter 7

SUMMARY AND CONCLUSION

The present investigation on *Momordica dioica* for *in vitro* antimicrobial properties confirms that, the plant appears to contain substances that exhibit measurable *in vitro* antimicrobial activity against some bacteria and fungi used in this study. The results of the various screening tests indicate that all the parts of this plant *viz.* roots, leaves, fruits and seeds possess some measurable inhibitory action against both gram-positive and gram-negative bacteria used in this study. However the roots of this plant alone possess significant inhibitory action against several bacteria as well as fungi than the other parts and therefore the roots of this plant are endowed with antibacterial and antifungal properties.

Among the various solvents used for the extraction and antimicrobial screening, the ethyl acetate exhibited higher activity with regard to the inhibition of bacterial growth, while ethanol and water exhibited higher activity with regard to fungal inhibition.

It is interesting to note that *Pseudomonas aeruginosa*, which is known to be a very resistant bacterium even to synthetic drugs, and *Salmonella typhi*, a multi drug resistant strain to Ampicillin and Chloramphenicol, which infects only human and produce typhoid fever were found to be very susceptible to the root extract of this plant.
Fungal strains such as *Aspergillus niger* and *Aspergillus flavus* which usually parasitize man and animal and cause pulmonary *Aspergillosis* and *Candida albicans* an ubiquitous fungus associated with the pathogenesis of skin diseases, urinary tract infections, vulva vaginitis and oral thrash were also found to be susceptible to the plant extracts. The spore germination of many test fungi with regard to percent of germination, germ tube length and mode of germination was also affected when higher concentration of the root extracts were used.

Preliminary phytochemical and histochemical analysis of different parts of the plant indicate the presence of biologically active compounds such as phenols, polyphenols, tannins, glycosides and terpenoids which are known to be antimicrobial in function. The isolated pure compound ursolic acid, a teriterpenoidal derivative strongly support this. The fatty acid profile of the roots reveal that the plant possesses some important as well as essential fatty acids which account for medicinal values.

It is appropriate to say that although several antimicrobial drugs are available at present, their use is limited by a number of factors such as low potency, poor solubility, drug toxicity and emergence of drug resistant strains. Therefore discovery of new, biologically active, safer and more effective antimicrobial agents are urgently needed. Medicinal plants usually constitute an important source of new and biologically active compounds. In this context, the experimental plant *Momordica dioica*, also an important medicinal plant which has been used all over the Asian countries for centuries in order to treat a wide range of physical ailments, appears to have a broad spectrum of anti-microbial action against several bacteria and fungi.
tested in this study. So this plant offers great potential for evolving newer pharmaceutical applications.

Although *Momordica dioica* is an important medicinal plant, any improvement in this crop is not possible because of its dioecious nature and vegetative mode of propagation. Moreover, germination of its seed is very difficult or impossible because of the hard seed coat. Therefore conventional techniques of reproduction are often tedious and impractical on a large scale. So the multiplication of this plant through micropropagation has assumed greater significance.

Attempts on the micropropagation of this plant demonstrated that complete and high frequency plant regeneration can be achieved through *in vitro* culture of internodal and cotyledonary explants on MS medium supplemented with various concentration of 2,4-D for callus proliferation and BAP and Kn for regeneration. All the regenerated shoots were rooted on MS medium supplement with different concentration of IBA and IAA and successfully transferred to soil.

The present investigation on *Momordica dioica* firmly establishes the following:

- The roots of this plant have both antibacterial and antifungal properties.
- *Pseudomonas aeruginosa* and *Salmonella typhi* the two important multidrug resistant bacterial strains are found to be susceptible to the root extract.
Fungal strains such as *Aspergillus niger*, *Aspergillus flavus* and *Candida albicans* which are often associated with the pathogenesis of various diseases in humans are also found to be susceptible to the root extract.

Ursolic acid, a potentially valuable triterpenoidal compound isolated from the roots of this plant exhibits a broad spectrum of antimicrobial activity.

Micropropagation of this plant has been achieved through *in vitro* culture of internodal and cotyledonary explants on MS medium supplemented with various concentration of 2,4-D for callus proliferation, BAP and Kn for regeneration and IBA and IAA for rooting of the regenerants.