

COMPUTER MODELING AND EXPERIMENTAL TESTING OF GREENHOUSE FOR OFF-SEASON CROP PRODUCTION FOR RURAL APPLICATION

BY

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Centre for Rural Development & Technology

Submitted
in fulfillment of the requirements of the degree of
DOCTOR OF PHILOSOPHY

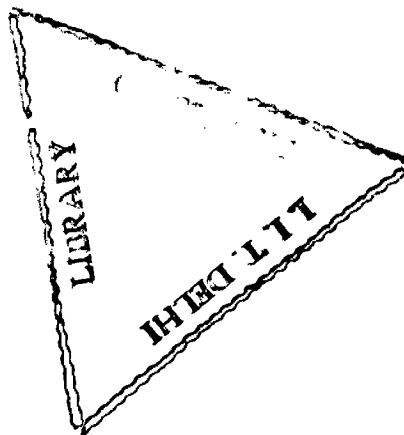
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MY FATHER
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AND
MY MOTHER
SMT. RAM DEVI SHARMA

ABSTRACT

In the present thesis, two greenhouses have been designed and developed for cultivation of cucumbers in pots and field conditions. The pot cultivation of the cucumbers has been found comparable to the field cultivation. These greenhouses have most of the cooling arrangements for optimum growth of plants in summer conditions.

A thermal model of the greenhouse has been developed to predict different parameters such as plant and the room air temperatures etc. This model has been experimentally validated for different aspects of cooling such as natural convection, forced convection, evaporative cooling, misting and the movable insulation. It has been found that there is a fair agreement between theoretical and the experimental values. A characteristic equation, has also been developed for the first time for a greenhouse, to find the greenhouse efficiency factor and the instantaneous thermal efficiency. The proposed model can be used for standardizing a greenhouse of any shape, size and location.

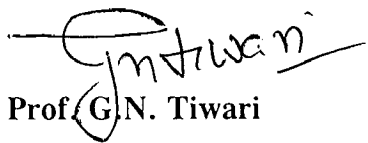
The proposed model has been successfully used for the parametric studies, to predict the effect of different parameters such as ventilation, heat capacity of plants, absorptivity of plants, relative humidity inside the greenhouse, movable insulation and the transmissivity of the canopy cover etc.

A thermal model has also been developed for different zones of the micro-climate of a greenhouse. The model has been validated experimentally and there is found a fair agreement between theoretical and the experimental values of the enclosed room air temperatures.

Finally, conclusions and suggestions for future work has been presented in the last section of the thesis.

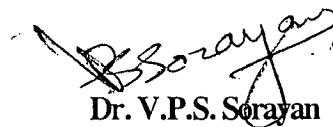
CERTIFICATE

It is certified that the thesis entitled "**COMPUTER MODELING AND EXPERIMENTAL TESTING OF GREENHOUSE FOR OFF-SEASON CROP PRODUCTION FOR RURAL APPLICATIONS**" submitted by **PRAMOD KUMAR SHARMA**, is worthy of consideration for the award of the degree of '**Doctor of Philosophy**' and is a record of the original bonafide research work carried out by him under our guidance and supervision. The results contained in the thesis have not been submitted in part or full to any other university or institute for the award of any degree/diploma.


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Date : July 24, 1998

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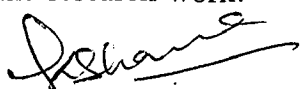
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