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Center for Smart Agriculture

Applied Hi-Tech Horticulture

Module 1: Types of ventilation

Sessions 6: Active and passive (forced cooling ventilation)

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Introduction

Ventilation is also important for air circulation and replenishing carbon dioxide.

Poor air circulation reduces plant activity and can lead to problems with humidity and disease management.

Air movement in the greenhouse should be between 0.2 and 0.7 metres per second. If carbon dioxide levels are not maintained, plant growth is affected.

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Main function of ventilation in green house

1. Exchange of air (or gas/CO2 and water vapour) between interior and exterior of a greenhouse
2. Cooling of greenhouse by ventilating the hot air created inside the green house)

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Ventilation vs. Cooling

Ventilation: bringing outside air into the greenhouse to lower the temperature.

Cooling: reducing the temperature of the greenhouse by: lowering the temperature of the air being brought into the greenhouse cooling the air inside the greenhouse using fog cooling shading

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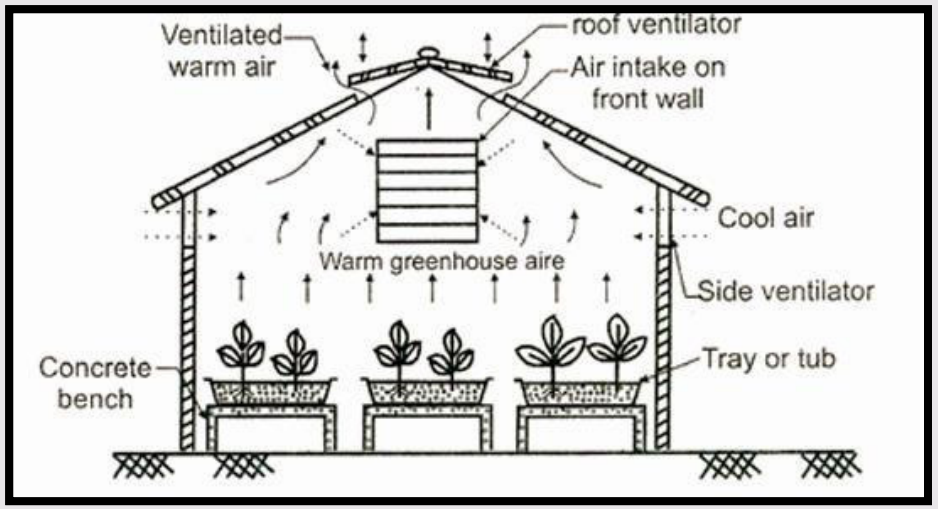
Natural ventilation

When the exchange of inside and outside air takes place with natural air current then it may be called natural ventilation



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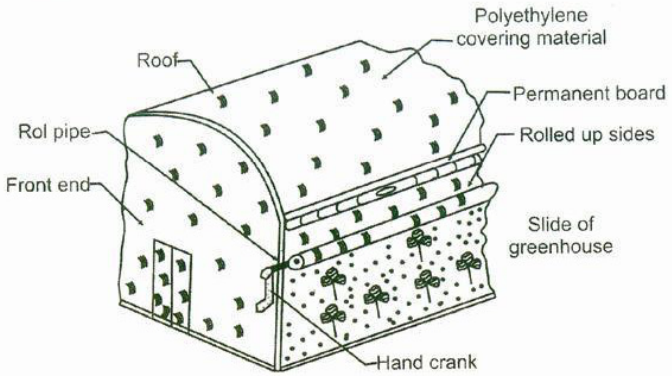
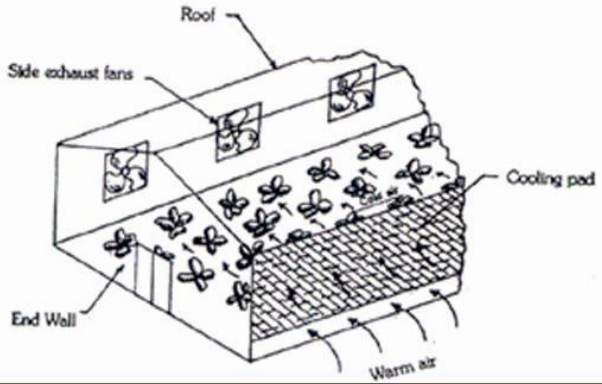
a. Roll up side passive ventilation in polyhouses

Roll up side passive ventilation



Fan-and-pad type active summer cooling system



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b. Forced Ventilation

In forced or active ventilation, mechanical devices such as fans are used to expel the air

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Cooling system in green house

1.Active summer cooling systems

a. **Fan-and Pad cooling system**
b. **Fog cooling system**

2.Active winter cooling systems

a.Convection tube cooling
b.Horizontal air flow cooling

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1.Active summer cooling systems

Active summer cooling is achieved by evaporative cooling process.

The evaporative cooling systems developed are to reduce the problem of excess heat in green house.

In this process cooling takes place when the heat required for moisture evaporation is derived from the surrounding environment causing a depression in its temperature.

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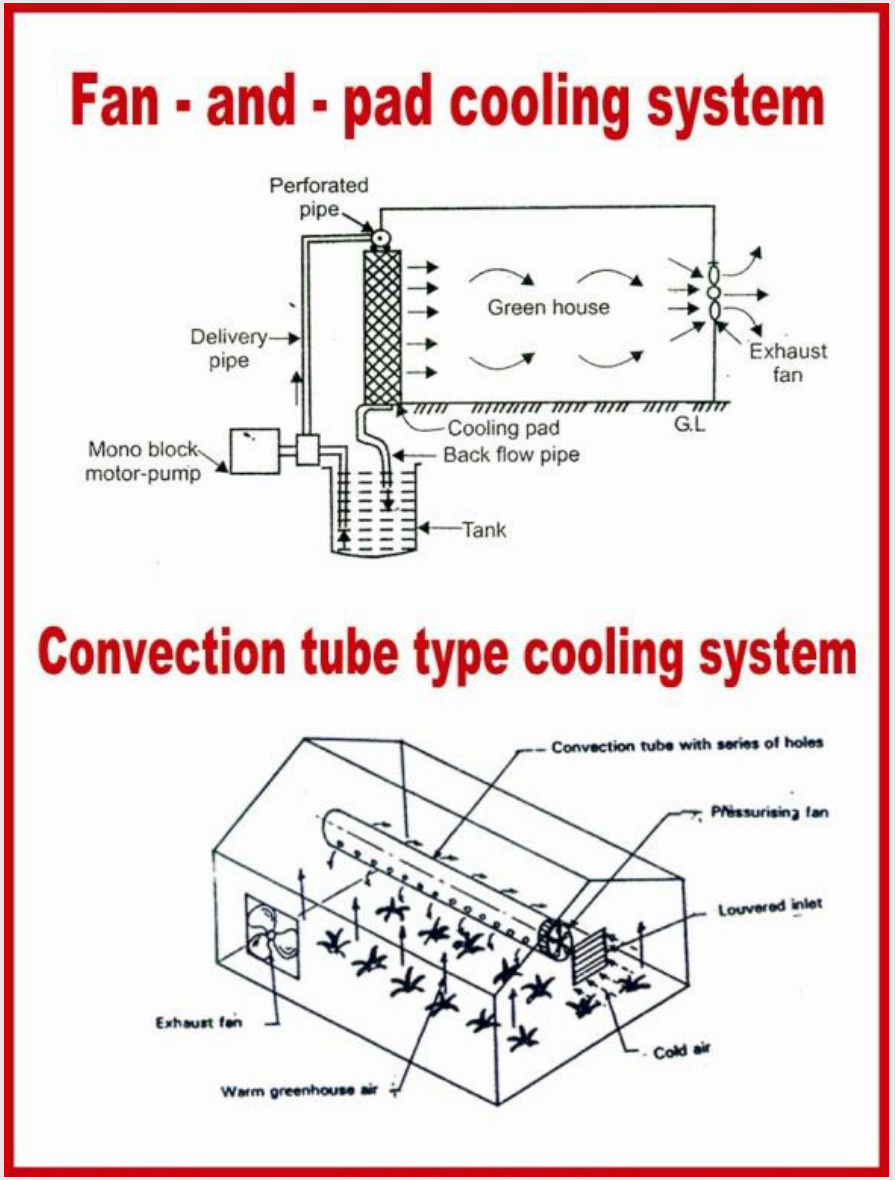
a. Fan-and Pad cooling system

✓One wall of the green house, water is passed through a pad that is usually placed vertically in the wall.

✓Exhaust fans are placed on the opposite wall.



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a. Fan-and Pad cooling system

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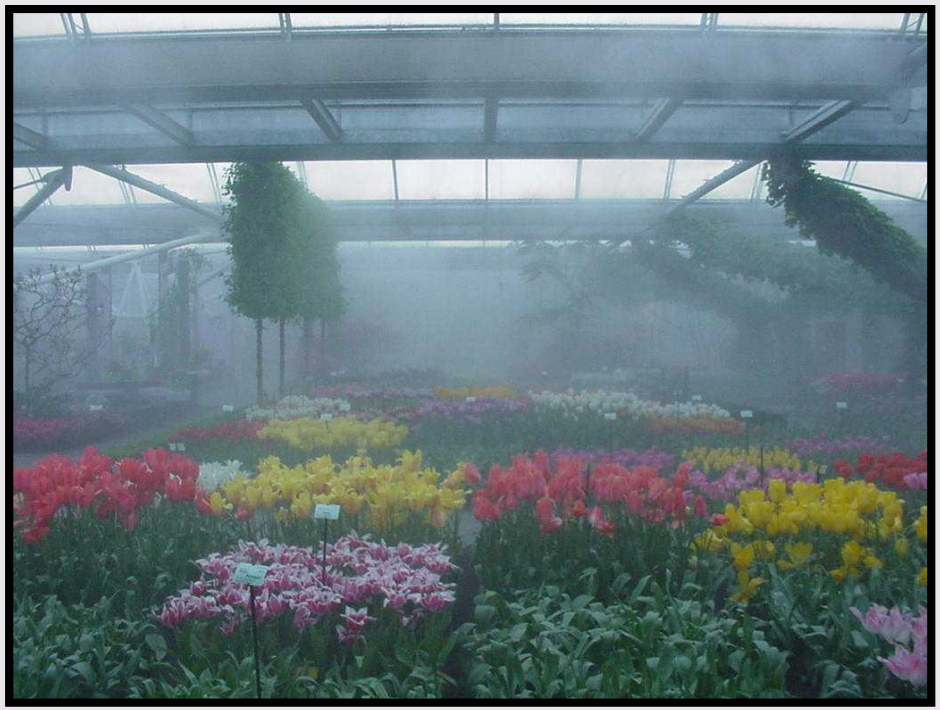
b. Fog cooling system

High pressure pumping apparatus generates fog containing water droplets with a mean size of less than 10 microns using suitable nozzles.



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2.Active winter cooling systems

The actual process in winter cooling is tempering the excessively cold ambient air before it reaches the plant zone

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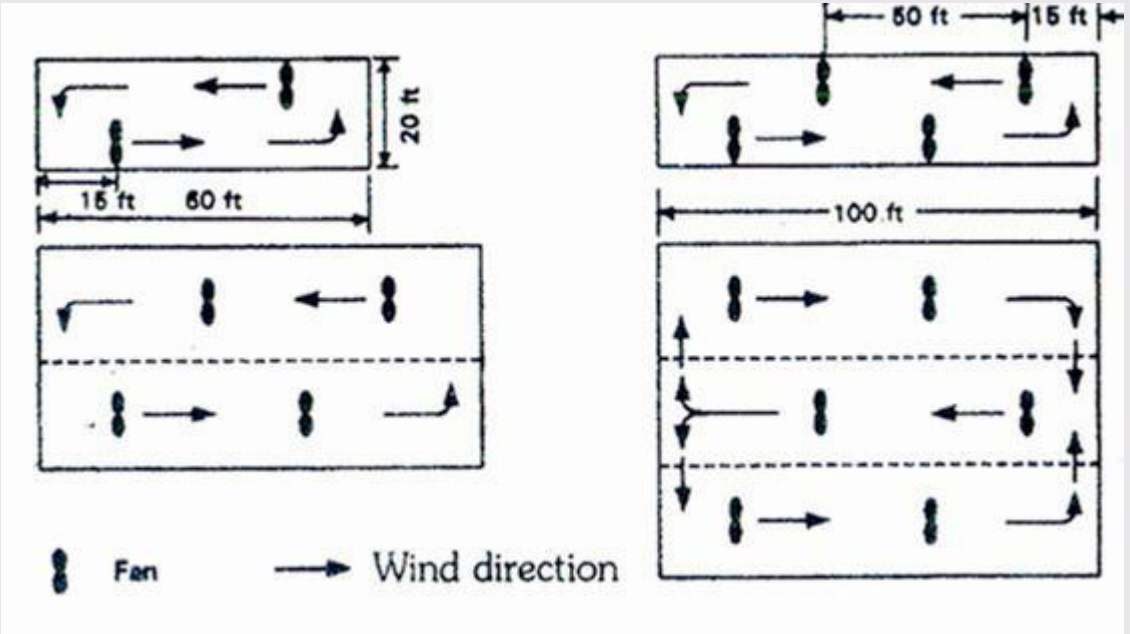
a.Convection tube cooling

The general components of convection tube are the louvered air inlet, a polyethylene convection tube with air distribution holes, a pressurizing fan to direct air in to the tube under pressure, and an exhaust fan to create vacuum

b.Horizontal air flow cooling



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THANK YOU