



Figure 7. Typical greenhouse range layout.

be a continuous section along the entire side or end of the greenhouse, be the correct size and thickness. A blank space in the pad, such as a doorway, will cause a hot spot through the house for a distance of 6 to 8 times the width of the blank. Exhaust fans should not be spaced more than 20-30' apart (Figure 1).

- Pads may be built inside the house or in the walls, or they may be built outside the house (Figure 8).

### FAN AND PAD COOLING SYSTEM OPERATION

Watch the pad condition carefully. If you notice bare spots or thin areas in the pad, you can be sure that much of the air entering the house is through these areas, which will result in hot spots in the house. To operate efficiently, the pad, pump system, fan system and control systems must be designed to operate as a unit. They must be checked frequently to be sure all parts are functioning properly. Manage the house operations so that doors are never left open and are opened only when necessary to move people or plants and equipment in and out. An open door can reduce the effectiveness of a pad cooling system significantly. The best house equipped with the best possible equipment and sophisticated controls can be a big loser without good management.

### Controls

The evaporative pad cooling system must have adequate controls for the operator to be able to adjust the house environment to provide maximum growing conditions for the plants and a comfortable environment for workers. Thermostats are usually used to turn fans and pumps on and off, as required to meet changes in outdoor climate conditions and

maintain more uniform greenhouse temperatures with lower operating costs. Thermostats should be checked each spring and fall against an accurate thermometer to insure proper operation.

A humidistat can be used to control pumps and fans of the cooling pad system to help prevent excessive greenhouse humidity. However, humidistats are much less reliable than thermostats. If it is desired to use a humidistat to control humidity, it is recommended that the humidistat be checked at least weekly to make sure that it stays in calibration. Humidistats should be checked against a psychrometer. Thermostats and humidistats must be located at plant level to function properly and should never be located on an outside wall.

Exhaust fans should be uniformly spaced not more than 20 to 30' apart. The fans may be wired so that the thermostats will turn on alternate banks of fans in sequence as the temperature demands. Some greenhouses are equipped with 2-speed fans which should be controlled with 2-stage thermostats. This arrangement will permit the first stage to turn the fan on low speed and off as required while the second stage will run the fan on high speed according to demand. It is important that, during the time of year a thermostat controls the heating system, the cooling thermostat which controls the first stage fans should be set 5-10°F above the setting of the heating thermostat to avoid having the heating and cooling systems on at the same time.

If evaporative cooling water pumps are controlled by humidistats and thermostats, they should be wired in series. This will help maintain more uniform temperatures and avoid excessive humidities. It will also help conserve power and water. In all cases, however, a thermostat should be used as the main