

House Location and Orientation

Orientation of the greenhouse in relation to other buildings or structures and in relation to prevailing summer winds has an influence on efficiency of operation and may affect fan arrangements or whether the pad fan will be located on the side or end walls.

Type of Cooling Pad

The most widely used type of pad material is corrugated cellulose that has been impregnated with wetting agents and with insoluble salts to help resist rot. These pads are expensive but when properly maintained do an excellent job of cooling air and if properly maintained, should have a lifetime of ten years.

Aspen pads have seen wide use in the past and some are still in service. However, under Florida conditions the life of an aspen pad is usually short. Aspen pads are very susceptible to algae infestation that leads to rotting and compaction. This makes it difficult to maintain an efficiently operating system without frequent and costly pad replacements.

Other pad materials are also on the market, but none has seen wide acceptance. Among these are pads fabricated from aluminum and from plastic fibers. Both these pads types are expensive and have not shown advantages over corrugated cellulose. However, an operator planning to replace an old pad system or install a new one should check out completely all the pad materials available. Then compare costs, life expectancy claims, cooling efficiencies, probability of maintenance problems before selecting the one that appears best for the operation.

Cooling Pad Area

The amount of pad area needed depends upon several factors, including the type of pad material used. The pads should be continuous along the entire wall. If aspen pads are used, it is recommended that one square foot of pad be provided for each 140 cu. feet per minute (CFM) of air moved by the fans. The fan capacity should be based on total CFM delivered at 1/8" static water pressure. Cellulose pads can be used with airflows of up to 230 cu. feet per minute per square foot of pad. With the higher airflow rates of cellulose pads, fewer square feet of pad area are needed.

Water Flow Rate

You must have adequate pad surface area and an adequate water supply and distribution system. The amount of water needed will vary with the type of system used, but normally, to assure complete pad surface wetting, about 1/3 gal of water per foot of pad length is recirculated. A valve should be placed in the line from the pump so the flow to the distribution pipe can be adjusted. You do not want a sheet of water flowing down the pad surface. This would increase resistance to air flow and cause transfer of free water into the house. You do want the pad surfaces covered with a water film. If in doubt about the correct quantity of water flow, check with the pad manufacturer. The water collected by the bottom gutter is returned to a sump from which the water is pumped to the upper distribution pipe or gutter. For houses more than 75' in length, it is usually more efficient to locate the sump near the center of the house. The sump should have a capacity of 1 to 1 1/4 gal for each linear foot of pad in order to hold the water that drains back to the sump when the system is stopped.

Problems With Cooling Pads

Evaporative cooling pads have severe problems in Florida. They are often subjected to many undesirable factors, such as clogging due to impurities in the water, algae and decay. If the pad material is clogged or decomposed its ability to function as designed is impaired. Air exhausted by the fans will enter the building at the point(s) of least resistance. If a pad area is totally or partially clogged, very little if any air will pass through that portion of the pad. If the pad has holes, the air will take the path of least resistance. This means less contact between air and water and much less cooling. When a pad has decayed, the only alternative is to install a new pad.

Airflow Through Cooling Pads

The required face velocity of the air will depend upon the pad material. Follow manufacturer's suggestions. This velocity will determine the number of square feet of pad area needed for a house of a given configuration. Regardless of the type of pad material used, the fans should have the capacity to provide a minimum of one air change per minute in the greenhouse. Have automatic shutters on the fans so there will not be back drafts when a fan is not operating (Figure 6).