THERMAL BLANKETS

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Research on thermal blankets has been conducted at Penn State, Rutgers, and other universities for over five years. Researchers have reported fuel consumption reductions of 20-40% when tightly sealed blankets, especially along the edges or on sidewalls were used.

Components of the system include: drive mechanism, support, blanket, and controls.

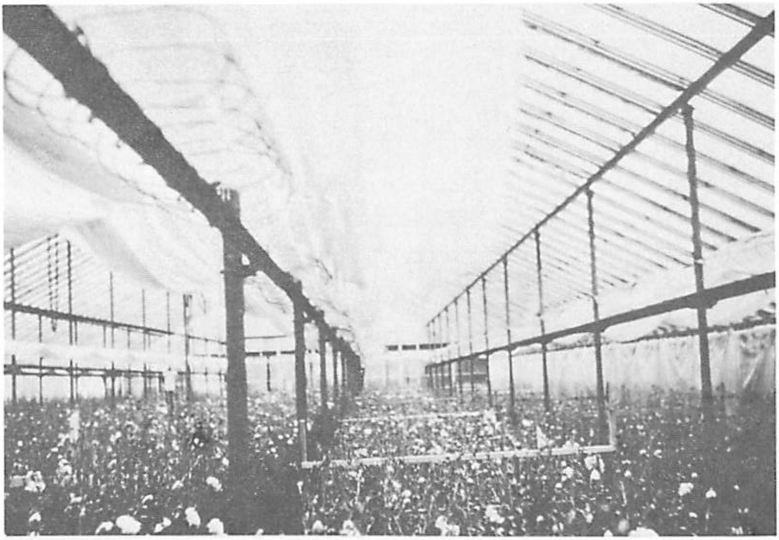

Figure 1. The simplest thermal blanket--clear polyethylene pulled by hand over wires from eave to eave. Note wires to protect the plastic from the steam main. If this "thermal blanket" is pulled after sunrise, little light is lost.

DRIVE

The common drive system consists of pulleys and cables. A slip clutch must be installed on the main drive to protect it and the blanket. Commercially available linear induction motor systems (mounted in the support tracks) are also available. Many systems are manually operated.

SUPPORT SYSTEMS

Prior to installing any support system, the greenhouse structure must be evaluated to determine that it can stand the additional loading. Curtains or blankets may be pulled gutter to gutter (suggested manner) or gutter

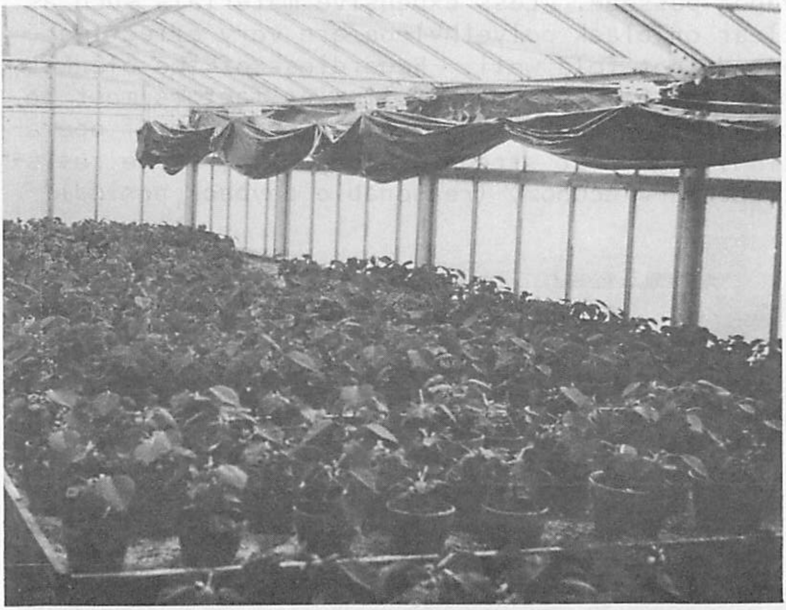

Figure 2. This manual thermal blanket of black polyethylene is a bit more efficient than clear poly (see Dr. Aldrich's article in this issue) but is more difficult to fold and must be opened at daybreak and closed after dark to avoid loss of photosynthate production by the plants.

to ridge. Blankets are normally pulled end to end in quonset-type greenhouses.

Supports consist of track, cables, wires or rope. A track system is preferred in a long span, where the load is evenly distributed over the entire structure. Blanket wear will be reduced in cable systems, when the blanket is suspended by small pulleys.

BLANKETS

Reflectorized coated plastics should always be placed with the reflective side outward. Research indicates that solid blankets will reduce heat loss 10-30% more than a porous blanket. Porous blanket materials do allow air and water vapor passage. Less expensive materials such as clear or black polyethylene are very effective but do not fold well. Regardless of the blanket material selected, the following factors must be considered: ease of installation, ease of operation, high tear strength, longevity, flame resistance, and economy (reasonable payback period).

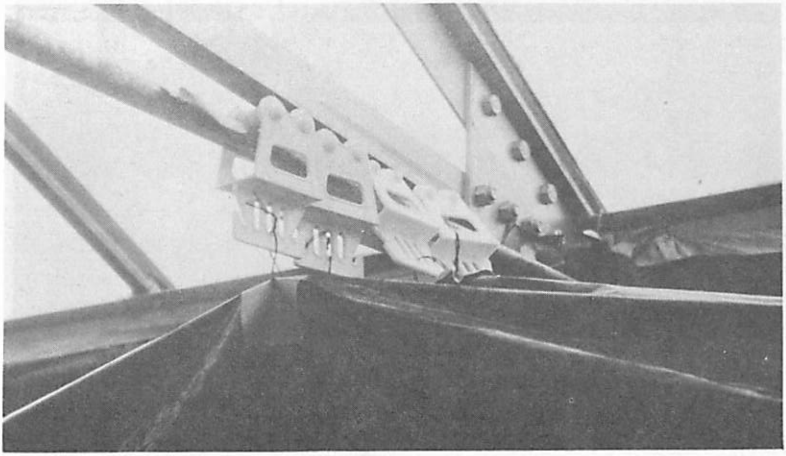

Figure 3. A close-up of the "closet clothes hangers" used to hang the black poly in Figure 2 for ease in pulling.

All heat should be located below the blankets except for snow clearance lines.

CONTROLS

Operation of the curtain system may be automated with a time clock or photocell. A snow warning device to automatically open the blankets during a snow storm is strongly advised. All automatic systems should also have a manual opening mechanism.

ALTERNATE USES

If the blanket system can be used for day length control and/or shading, the cost can more easily be justified.

PROBLEMS

1. Difficult and expensive to retrofit in purlin post houses or houses which contain many heat lines above the blanket.

Figure 4. An automated thermal blanket in a large greenhouse.

2. Day storage of the blankets will cause some shading and may reduce crop quality.

3. Nonporous blankets collect condensate dripping from the roof. It may also raise the humidity under the blanket.

4. The melting frost from the inside of the glass may cause crop damage.

5. If the curtain is not retracted during a snow storm and damage should occur, insurance may be nullified.

INSTALLATION COSTS

The cost of an internal blanket system ranges in price from $0.30 to 0.85/sq.ft for a manual system to $1.20 to $3.00/sq.ft. for an automated one.

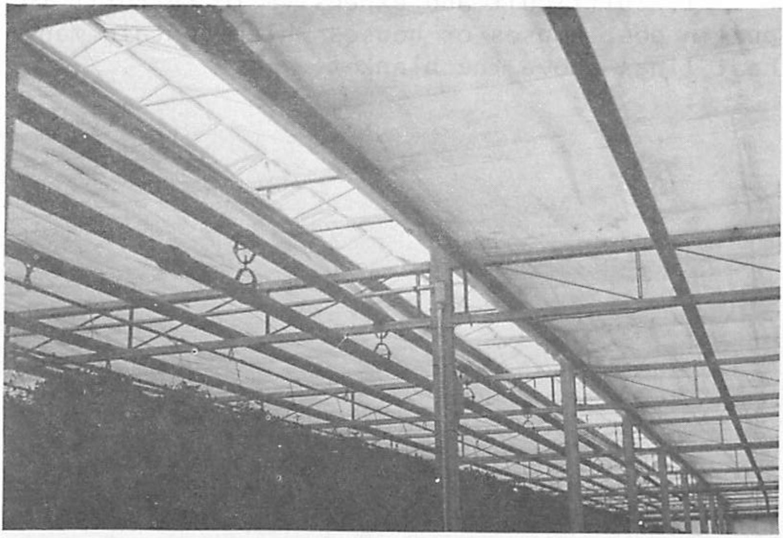

Figure 5. An automated, translucent and permeable thermal blanket that can be used for summer shade and averts the problem of "bags" of water from overhead, drip from condensation or leaks. It may be somewhat less efficient than some other blankets.

PAYBACK PERIOD

Payback period or return on investment is about 2-3 years. One grower, however, felt that the fuel saved in January and February paid for the blanket material.

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Figure 6. A blanket pulled lengthwise in a hoop house which is also used for daylength control of chrysanthemums.

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