an alternative for those who want the protection and the increased flexibility of propagating in the winter months without the high cost of a commercially-designed system. Estimated cost for this system is shown in Table 3.

Table 3. Estimated installation costs for Tawakoni hotbed with respect to payback on investment.

Costs:	
Equipment cost:	
Heater, pump, reservoir tank, piping, etc.	$1769.66
Propane cost:	
Price at .88 per gal. over 4 months	868.60
Labor cost:	
Installation, cutting of plants to fill bed, mixing of soil, filling pots, etc.	780.00
Hardgoods cost:	
Pots, flats, soil, etc.	520.00
Total Costs	$3938.26
Assets:	
Cuttings stuck and placed on hotbed	19,764
Multiply by rooting percentage	× .85
Number of rooted plants produced	16,799
Multiply by lowest average market price	× 0.35
Total value of plants produced	$5879.65
Less costs	−$3938.26
Net profit in first year	$1941.39

GAS: A HEAT SOURCE FOR WINTER PROTECTION

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The purpose of this project was to find an efficient and economical heat source for our liner houses.

Before Hurricane Frederic of 1979, the houses at Cottage Hill Nursery container division were equipped with Modine heaters. After the storm we had to rebuild, so this was a good time to consider changes in heating equipment. We decided to try different heaters to make our heating more efficient and economical. We considered three posibilities:

(a) Replace Modine heaters.

(b) Use an open-flame heater topped by a container of water.

(c) Turn on the misting system during extremely cold nights.

These houses are used for overwintering liner stock, so we do not need a growing temperature. Choice (a) was out because of cost. Choice (c) required the presence of an employee at night, checking to see that timers were working properly. This also could present a problem of over-watering. Choice (b) seemed the simplest solution. We thought it would be economical. It produced warm moist air, required no ventilation, and kept the temperature above freezing.

The first heater we tried had several flaws. The burner with 100 holes was using too much gas. The placement of the valve made it difficult to turn on and off, and there was no easy way to light it.

Another heater we could have made locally with a one-hole orifice. This would cut down on fuel consumption. It had an easily-accessible valve for convenient lighting. This is the heater we chose.

Along with trying out new heaters we put double poly on each house and double front and back. We use a drop cloth in front of each door and window. Even in the cold 1°F temperature we experienced in January 1985, these heaters performed well. There was no ethylene damage.

Outside our icing-over produced phenomenal pictures, but not such good results. Our covered plants outside came through without any damage. Although the temperature in the house dropped to freezing we did not lose any significant number of plants.

We discovered we must take precautions against setting the flame too high. A high flame evaporates all the water in the barrel. A low flame, just enough to produce a fair amount of steam, is all that is required.

This system is practical, economical and has been a plant-saver at Cottage Hill Nursery.