

## Dealing With High Energy Costs

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## Rule of Thumb

For each °F we reduce the temperature of the greenhouse, we reduce 3% the cost of heating.



*Can I lower the temperature and still produce quality crops?*

The answer is: maybe, but most likely not.

It depends on the crop.

Vincas and begonias = no  
Nemesias and trailing snaps = yes

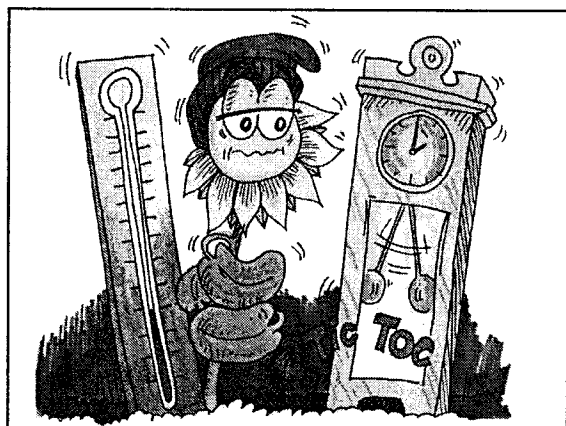
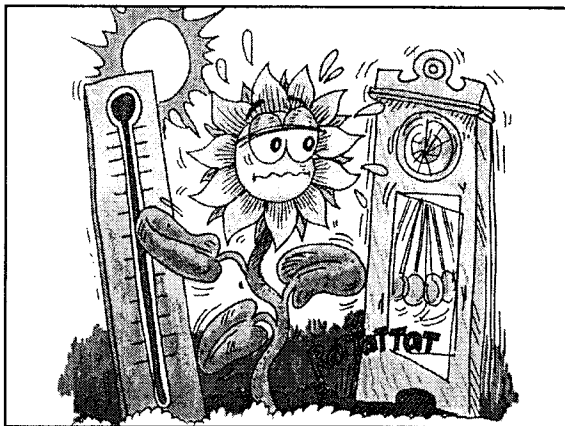


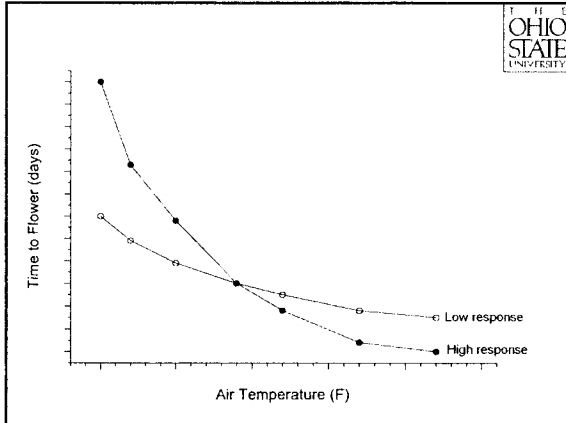
## Effect of temperature

Temperature affects growth and development

*Growth* refers to increase in size

*Development* refers to the aging process (timing)





## Lowering the temperature

*It may not be an advantage to heat less for a longer time!*

## Lowering temperature

If you plan to reduce greenhouse temperature, reduce BOTH day and night temperatures trying to maintain the smallest +DIF possible

Again, this still will result in longer growing times

## Compartmentalization

- Creating compartments in a large greenhouse
- Using different separate structures
  - Grow cool crop separate from warm crops
  - Keeping and hardening
    - marigolds grown at 60 F hardened at 50 F
    - pansies grown at 55 F hardened at 45 F

## Rule of thumb

Hardening can be achieved at temperatures 10 F below growing normal temperatures for many crops

## Space management

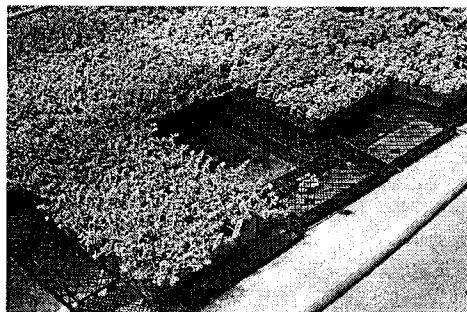
- Start pot to pot and expand (open and heat new areas)
- Make efficient use of greenhouse space
  - Movable benches
  - Staggering pots vs. placing them on rows.

*It is possible to put 15% more pots by staggering than by standard row spacing*

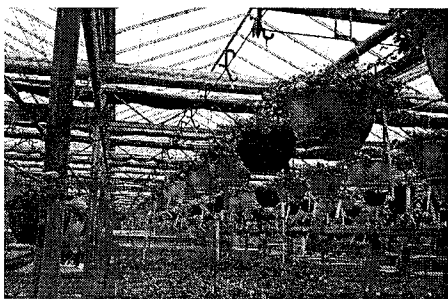
### Do not have crops on the floor



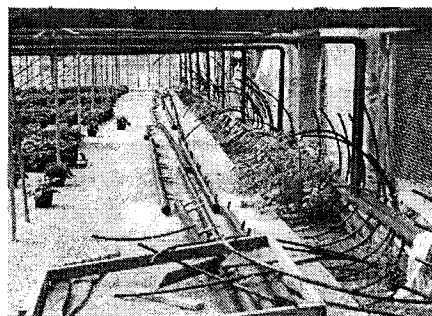
### Do not have crops on the floor



### Use thermal blankets



### Use heated floors



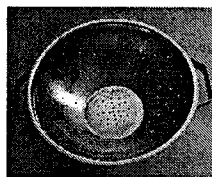
### Grow cool-crops

- |               |                    |
|---------------|--------------------|
| Alstroemeria  | Fuchsia (some cv.) |
| Alyssum       | Gazania            |
| Ancmonc       | Iris               |
| Argyranthemum | Matthiola          |
| Aquilegia     | Nemesia            |
| Bracteantha   | Ostospermum        |
| Calceolaria   | Pansy              |
| Calendula     | Primula            |
| Centaurea     | Ranunculus         |
| Coreopsis     | Schizanthus        |
| Delphinium    | Snapdragons        |
| Dianthus      | Statice            |
| Diascia       | Torenia            |
| Dill          | Tulip              |
| Freesia       | Veronica           |
|               | Viola              |



### Greenhouse weatherization

What is the relation between these two pictures?



## Greenhouse weatherization

A typical greenhouse structure contains heat as efficiently as a colander contains water.

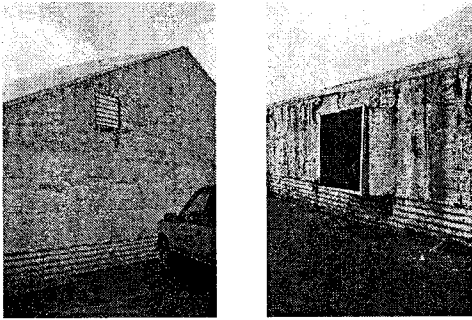


## Greenhouse weatherization

- Seal holes in the polyethylene film and cracks in the walls
- Repair doors and vents that do not shut properly
- Insulate walls that are not made of translucent materials
- Insulate all metal parts that have contact with both the interior and the exterior of the greenhouse



## Greenhouse weatherization



## Greenhouse weatherization

There are good sources of information on how to weatherize greenhouses, for example the website of the National Greenhouse Manufacturers Association: [www.ngma.com](http://www.ngma.com)

Also contact Dr. Peter Ling in Wooster

