

## USE LESS ENERGY TO MOVE AIR

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Air is a fluid. It is heavier than many people think. It can flow like water draining from a bathtub, circling with very little energy input. It can be pushed around the greenhouse to provide horizontal air flow (HAF) with relatively little energy.

Air can also be pushed through tubes like water. Small holes in the tube will provide distribution of the air throughout a greenhouse. However, the velocity of this air a few feet from the tube is so low that only moderate temperature uniformity is gained and leaf "scrubbing" is minimal.

Furthermore, when the greenhouse calls for ventilation and a fan starts, a louver opens to introduce fresh air which is blown into the tube for distribution. This means that both fans are in effect blowing the same air.

There are, then, two functions for a fan connected to a distribution tube:

1. Circulate the air in the greenhouse
2. Distribute fresh air drawn in by an exhaust fan.

In (1), the air movement is minimal. Much greater air movement (reducing temperature differentials and disease incidence while increasing CO<sub>2</sub> utilization) is possible with less power by using smaller fans to produce HAF.

In (2), the distribution tube should be connected directly to the air intake. The air will enter by virtue of the pressure deficit caused by the exhaust fan. This will give up to a 50% reduction in power usage. If the distribution tube fans are sized for heating, over 50% will be saved.

The cost of power consumed in a 25 x 100' house could be calculated as follows:

	(1) HAF and tube	(2) Fan in tube	Comments
<u>Air</u>	4 x 1/20	1/4 HP	HAF more
<u>Circulation</u>	HP=1/5 HP		efficient.
Power required	240 watts/ hour	300 watts/ hour	
Assume 250 days/year	1440 KWH/ year	1800 KWH/ year	Varies with location and crops.
Cost @ \$.05/KWH	\$72	\$90/year	Could be higher.
<u>Winter</u>	1/4 HP	1/2 HP	
<u>Ventilation</u>			
Power required	250 watts/ hour	500 watts/ hour	
Assume 1000 hours/year	250 KWH/ year	500 KWH/ year	Varies with location and crops.
Cost @ \$.05/KWH	\$12.50	\$25	Could be higher.
Sum	\$84.50	\$115.00	\$30.50 difference.

The above figures do not consider the savings in installation costs for HAF and Fan/Tube ventilation which should be from \$100 to \$200 per house.

If you already have a distribution tube fan, you might consider moving it from the tube to directly circulate the air in the house-- and connect the tube directly to the louver. You will need another small fan or two to establish a good HAF pattern.

The advantages of (1) over (2) are:

- a. Lower installation costs.
- b. The advantages of horizontal air flow.
- c. A savings in electricity of perhaps \$30 per house every year.

#### REFERENCES

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