COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY • COLLEGE OF AGRICULTURE

Using Fans in Conventional Burley Barns

By *George A. Duncan,* Extension Agricultural Engineer, Agricultural Engineering Department.

Each year burley producers seem to encounter a different crop and curing season. They then become concerned about ways to aid or to improve the natural curing conditions in extremely wet or dry weather. With the shortage and increased price of coke and other fuels for supplemental heat, producers ask what can be done to overcome bad curing conditions, should they occur. Many are interested in the use of fans as an alternative to supplemental heat. The following are guidelines for the use of fans to aid circulation and curing in a conventional burley barn.

Move Air Through the Tobacco!

Making air pass through the tobacco rather than just circulating around the driveway or gable space is one important factor in the successful use of fans. A second factor is to move enough air to justify your effort in obtaining and using the fans. Most fans in the gable end of conventional barns are of inadequate size and do little more than short-circuit air through nearby wall and eave cracks, thus not helping the mass of tobacco throughout the barn.

The larger airplane propeller-type fan mounted on a 2-wheel trailer and PTO powered certainly is capable of moving the quantity of air needed but must be harnessed to move the air where it does good. If you have one of these fans or plan to borrow or buy one, do the following for more effective use of the unit.

Place the fan in a doorway and close off most of the remaining opening with plywood, metal, tarps or other materials to block air escape or short-circuiting. Close all lower ventilator doors for the first 50 to 75 feet beyond the fan, or one-half of the barn for short barns. Then place 2- to 3-foot-wide plywood strips or wide boards in a near-vertical position at various points in the jetstream of the fan to deflect the air upward and through the tobacco. Move these air baffles around every hour or two to ventilate other spots of tobacco, as required. Adjust the size and position of the baffles to prevent wind damage and shattering of the lower tip leaves. This technique helps direct air upward through the tobacco in the near portion of the barn and then out the eave or far portion of the barn. Periodically move the fan to the other end of the barn to equal conditions. Lay boards, metal or similar material on the ground for several feet in front of the fan to prevent dust and dirt disturbance, as necessary.

Electrically Powered Fans

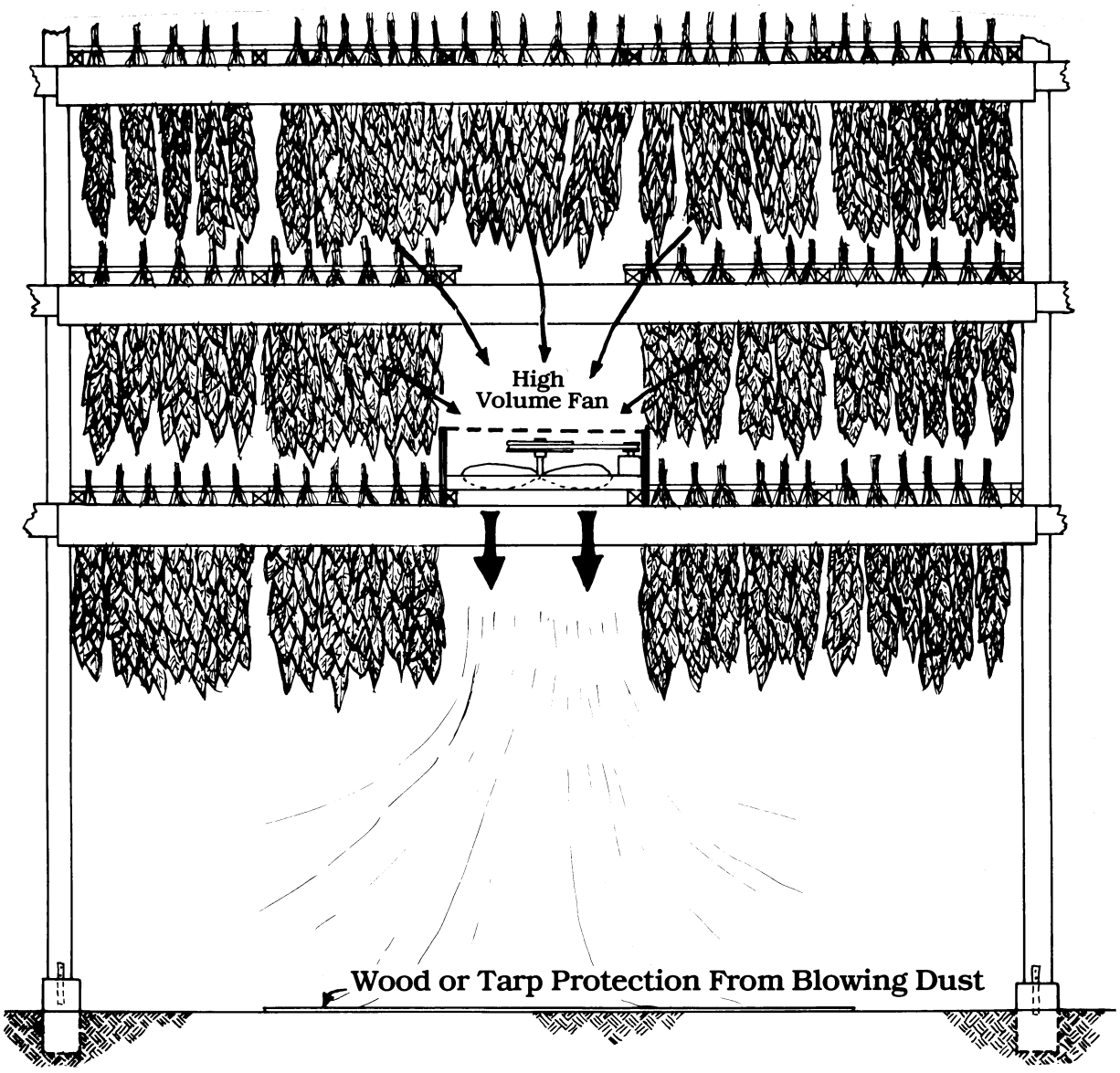
Place a fan horizontally in the center, bottom rail of every other bent for a more efficient and effective use of electrically powered fans in conventional barns. (See drawing.) This pulls any humid, stagnant air through the mass of tobacco from above and around the fan and blows it directly down to the ground. Thus, air is moved through the central core of the tobacco where moisture problems generally occur first. Sticks of tobacco are omitted directly above the fan and plants are moved sufficiently away from the sides to prevent damage by the fan. Place a wire-mesh covered frame over the fan for safety and to keep leaves and plants from falling into and damaging the fan. Leave the side ventilators or other doors open to allow the ground-level moist air to move out and the fresh dry air to come in around the eave.

Fan size and airflow capacity depend on what effectiveness is to be achieved. Good quality fans of 36-, 42- or 48-inch diameter and 1/3-, 1/2- or 3/4-Hp should be suitable for the above circulation method in conventional barns, depending on the size of the barn, amount of tobacco, and amount of air movement needed to aid curing. See Figure for procedures to estimate fan size needed.

Operate the fans continuously (24 hours per day) during rainy or humid weather. Operate the fans several hours each day during the first two to three weeks of curing if the tobacco needs more air movement and drying than natural weather conditions are providing. In very cool, dry weather do not operate the fans during the day as over drying can occur and possibly set off-colors in the tobacco.

When planning to use electrically powered fans in a conventional barn, check the existing electric wiring and service entrance components carefully as the barn may have been wired only for driveway or stripping-room lights and does not have sufficient electrical capacity to operate fan motors. Damaged and burned-out wiring or motors can result quickly. Barn fires may be caused from insufficient electrical service capacity. Have a local electrician or utility company representative check your electrical circuits.

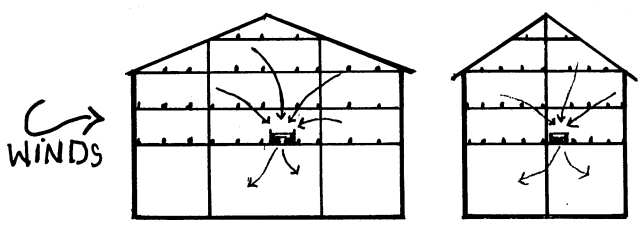
Use of Fans in Conventional Burley Barns to Aid Curing



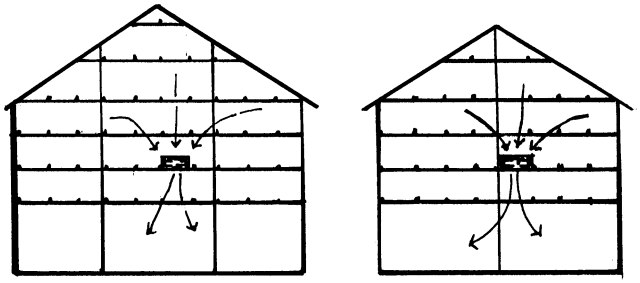
High Volume Fan Mounted in Lower Center Tier Rail of
Every Other Bent of Conventional Tobacco Barn to Aid Air Circulation and Curing

Fan Locating and Sizing Guidelines

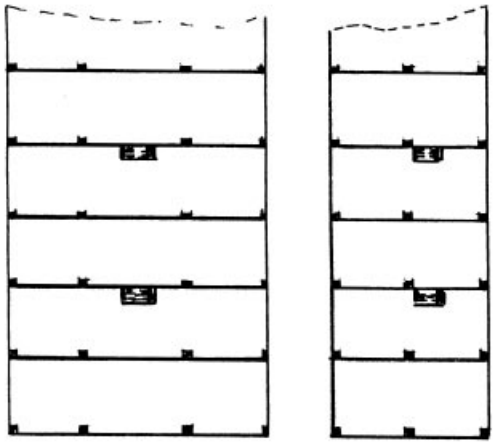
Locating Fans:



A. 4 Tiers or Less
Fan in bottom center tier or first rail off-center away from prevailing winds. No tobacco hung directly over fan.



B. 5 Tiers or More
Fan in second tier, center rail space or first rail off-center away from prevailing winds. No tobacco hung directly over or under fan.



C. Use one fan every other bent at crossbeam, or otherwise equally spaced, omitting end bents.

Sizing Fans:

D. To determine fan size, compute approximate effective volume served by each fan:

Volume = Width X Length X Height

Example: Volume = 28 ft X 24 ft X (6 tiers X 4 ft)
= 16, 128 cubic feet

Thus, for good air flow:

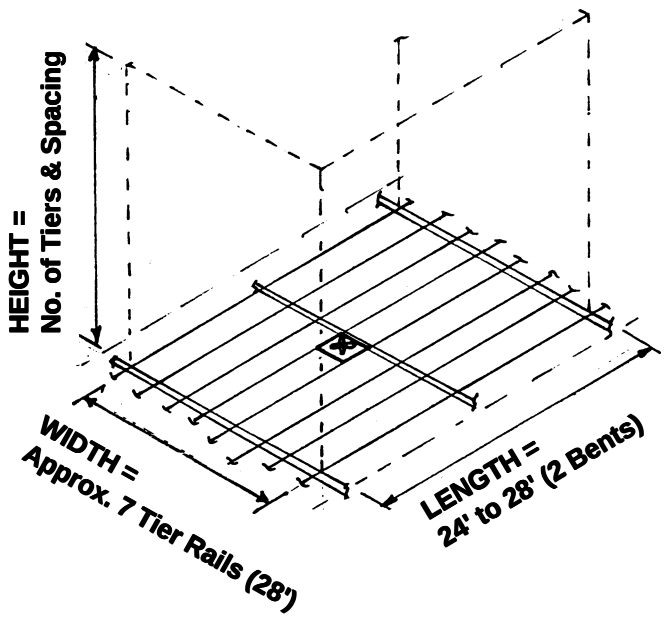
$$\text{Fan CFM} = \frac{16{,}128 \text{ cubic feet}}{1 \text{ minute}}$$

= 16,128 CFM

For fair air flow:

$$\text{Fan CFM} = \frac{16{,}128 \text{ cubic feet}}{1.5 \text{ minute}}$$

= 10,752 CFM



For **good** air flow, use an air change each 1 **minute.**

For **fair** air flow, use an air change each **1.5 minutes.**

For **minimum** air flow, use an air change each **2 minutes.**

Sample Fan Sizes and CFM Ratings

Fan Size	A	B
36"	40"	18"
42"	46"	19"
48"	54"	20"

Typical Performance Table

Fan Size	HP	RPM	CFM vs. Static Pressure				Maximum BHP	Approx. Ship. Weight
			.000"	.100"	.125"	.150"		
36"	1/3	431	10300	8800	8300	7700	.39	106
	*1/2	495	11800	10500	10200	9800	.59	111
	3/4	575	13700	12600	12400	12000	.92	115
	1	634	15000	14200	13900	13700	1.23	123
42"	1/3	342	12800	10500	9800	8000	.42	142
	*1/2	385	14400	12500	11900	11200	.60	146
	*3/4	442	16600	15000	14500	14000	.91	155
	1	485	18200	16800	16400	15900	1.20	163
48"	1/2	308	17500	14600	13600	12100	.63	185
	*3/4	354	20100	17800	17000	16200	.96	210
	*1	382	21700	19600	19000	18200	1.20	218

*Select fan SIZE and HP to give CFM at 0.0" or 0.1" static pressure

Typical Single-Phase A.C. Motor Currents

Motor Horse-Power	115 Volt Full Load (Amps)	230 Volt Full Load (Amps)
1/3	7.2	3.6
1/2	9.8	4.9
3/4	13.8	6.9
1	16.0	8.0

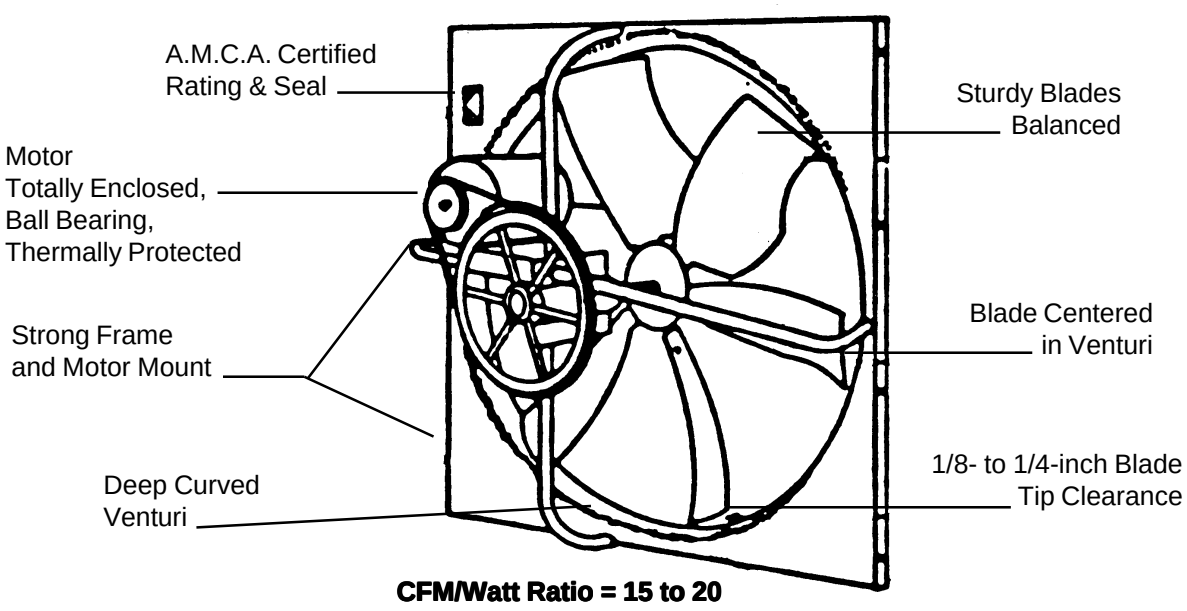
To Ensure Dependable Fan Performance and Operation, All Fans Should:

1. Be A.M.C.A. rated and certified for required air delivery at 0.10 inch static pressure.
2. Have totally enclosed, ball bearing, thermally protected motors.
3. Have heavy-duty welded frame and motor mount, with deep curved venturi.
4. Have airfoil-formed steel blades welded to hub or cast aluminum blades, with 1/4- to 3/8-inch maximum tip clearance in venturi.

NOTE: Avoid open type motors which allow dirt and moisture to enter and shorten life or endanger motor or barn by burn-outs. Avoid thin aluminum blades riveted to lightweight hub due to low efficiency of air flow and ease of damage.

IMPORTANT: Inspect fans and tighten belts annually to ensure safe operation and full capacity air flow. Use proper wiring and fuse protection.

10 Points of a Good Fan



CFM/Watt Ratio = 15 to 20

Wire Size Seletion*

A. Copper, 115-120 Volts, Single-Phase, 3% Voltage drop.

Load in Amps	Length of Run in Feet					
	50	100	150	200	250	300
10	12	12	10	(Use 230 Volts)		
15	12	10	8	"		
20	12	8	6	"		

B. Copper, 230-240 Volts, Single-phase, 3% Voltage Drop.

Load in Amps	Length of Run in Feet					
	50	100	150	200	250	300
10	12	12	12	12	10	10
15	12	12	10	10	8	8
20	12	12	10	8	8	6
25	12	10	8	8	6	6
30	12	10	8	6	6	4
35	12	8	8	6	6	4
40	12	8	6	6	4	4
50	10	8	6	4	4	3

C. Aluminum (Triplex), 230-240 Volts, Single-phase, 2% Voltage Drop.

Load in Amps	Length of Run in Feet.						
	100	150	200	250	300	400	500
20	8	6	4	4	3	2	1
30	6	4	3	2	2	0	00
40	4	3	2	1	0	00	000
50	4	2	1	0	00	000	4/0
60	3	2	0	00	00	4/0	250

*From Agricultural Wiring Handbook, 1978, Food & Energy Council, 909 University Avenue, Columbia, MO 64201.

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