



Low-Cost Post-Row Field Tobacco Curing Framework

Prepared by G. A. Duncan, Agricultural Engineering, and Steve Isaacs, Agricultural Economics

The need for economical, alternative tobacco curing space has spurred interest in several field curing methods. Research efforts have developed and evaluated several one-tier portable frame and field structure designs over the years. Farmers have innovated and adapted additional ideas.

The field framework described here is a combination of several methods and ideas that seem to have the best features for producers to follow. Several *DOs* and *DON'Ts* are stated along with suggested structural details to provide producers with the best possible guidance on this alternative field curing option. Although this method has higher risks from potential wind and rain damage than good barns or some other field structures, the trade-off is the low construction costs. It is not necessarily a “hang-it-and-leave-it” type structure, as managing the plastic cover will greatly influence the quality and quantity of tobacco cured.

Three main advantages of this post-row framework are the low cost, simple construction, and reduced labor for hanging and removing tobacco. A disadvantage is the added care and management to secure the cover against wind and rain.

Length of Framework Needed

The total length of framework needed is directly related to the stick spacing you can use. The number of sticks per 13'-3" of clear space between posts is shown in Table 1, and the capacity of a 96-ft framework (7 sections) is shown in Table 2.

TABLE 1: Sticks per 13'-3" Section Based on Stick Spacing

Stick Spacing	No. of Sticks
5.5 inch	57
5.0 inch	63
4.5 inch	71
4.0 inch	79

*NOTE: The 5-5.5-inch spacing should be used for large barely-wilted tobacco with potential yields over 3,000 lbs per acre. The 4-inch and any closer spacings should be used **only** for smaller well-wilted tobacco that may yield less than 2,500 lbs per acre. Weather conditions and management of the plastic during the cure will greatly affect the quality of the cure with any spacing. Twelve-foot long materials could also be used and would provide a clear space of 11'-3" between posts.*

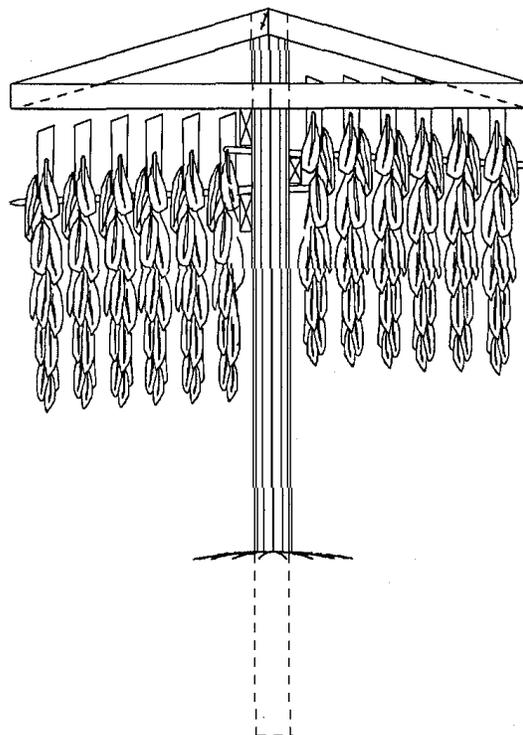


TABLE 2: Capacity of a 96-foot Framework

Stick Spacing	Capacity	
	Sticks	(Ac)
5.5 inch	399	(.32)
5.0 inch	441	(.35)
4.5 inch	497	(.40)
4.0 inch	553	(.44)

NOTE: Acreage capacity based on about 7,500 plants per acre (40" x 20" with 95% stand).

The 96-ft length is one convenient length that would enable a 100-ft roll of plastic to cover the framework. Longer lengths can be used, but multiples of 96 feet seem to work best for installation of plastic covering.

Location

Field curing structures need to be located in an area with good surface drainage, good air movement, a grass or sod cover, and easy access with transport equipment (tractors, wagons, trailers, trucks, etc., with turning space). Locating near the crop production fields reduces field transport time but may require more time for travel during curing management.

Good surface drainage aids in letting surface water drain from the area and in reducing the moisture and humidity under and around the tobacco during curing.

A grass or sod cover provides firm support for vehicles during wet soil conditions when access may be necessary.

The grass or other vegetation should be mowed *closely* right before hanging the tobacco so air movement is not restricted under the tips of the tobacco and a source of extra moisture is reduced.

Thirty to 40 feet of space is needed at the ends for access with tractor and wagon and 17 to 18 feet between rows of posts for access between hanging tobacco.

Locating on the downwind side of a wooded area could offer some protection from strong prevailing winds during thunderstorms or other inclement weather but may also inhibit air movement during fair weather when ventilation is needed for good curing. Locating in an open field area would provide the best of ventilation for curing and accessibility but require greater attention to covering for strong winds.

Orientation

An orientation broadside to prevailing winds gives the best cross-ventilation for curing but causes maximum exposure of the plastic cover to wind forces. Orientation in line with prevailing winds reduces the effect of strong winds but may inhibit some cross-ventilation for effective curing of closely spaced tobacco.

Orientation for water drainage and other sunlight or climatic conditions has not been determined. Until further guidelines are determined, it is probably best to orient the structure to fit your terrain and access needs with some favor towards the alignment in-line with the strong winds to reduce wind effects.

Construction

The type of materials used for construction will depend on your preference for low cost or long life of the framework. Home-cut posts of native trees would keep cash costs to a minimum if you have the time and timber. The estimated life of some native wood species is shown in Table 3. Realize the expected life of natural wood depends on the relative amounts of sapwood and heartwood, the soil moisture conditions and the presence of termites.

TABLE 3: Expected Life of Some Wood Species for Posts¹

<u>2-7 Years</u>	
Ash	Hickory
Beech	Honey Locust
Birch	Maple
Cottonwood	Oak (Red)
Douglas Fir	Pine
Elm	Sweet Gum
Hackberry	Sycamore
Hemlock	Yellow Poplar
<u>7-15 Years</u>	<u>Over 15 Years</u>
Cedar	Black Locust
Oak (White)	Osage Orange
Red Cedar	
Redwood	<u>Over 30 Years</u>
Sassafras	Most preservative treated

¹Reference: *Farmers Bulletin 2049, USDA and Publication A3052, Univ. of Wisconsin.*

The selection of posts will be your first factor in the expected life of such a field structure. A second factor will be the wood used for the stick supports. Aboveground use of the above species will result in much longer life and is influenced by how much weather protection is provided. Whether you will protect the wood in the non-tobacco season with plastic or leave it exposed to the sun and rain will be an important factor in longevity and costs.

Post lengths need to be 12 to 13 feet depending whether top plastic support members are used. Post diameters need to be 5 to 6 inches minimum round or square or larger.

Filling the framework from a wagon or trailer bed is easier and faster with one worker and wagon required on each side (Fig. 1).

The three-member stick support design is preferred over the two-member cable-hoist design for this application because of the stronger strength of the span, members on edge, nailed members at the posts, and ease of lapping the members on the posts to reduce cutting to exact lengths.

The posts need to be set about 36 inches deep in most soils and no less than 30 inches deep in very firm, well-drained clay soils. When rocks limit these depths, move to another location, break up or blast out a suitable hole, use supplemental bracing or gamble on shallower posts to keep them from blowing over with wet soil and strong winds.

Space the holes 13'-9" apart as shown in Figure 2 to accommodate 14-ft lumber. If 12-ft lumber is used, space the holes and posts 11'-9" apart.

Backfill and tamp the post holes with firm clay, other suitable soil, small gravel, or a lime-gravel mix for firm anchorage.

The wood members for the stick supports can be untreated or treated lumber depending on your preferences for low cost, long life, or what is readily available. Sawmill lumber of one of the stronger species is recommended. Table 4 lists the relative strengths of some of the readily available species.

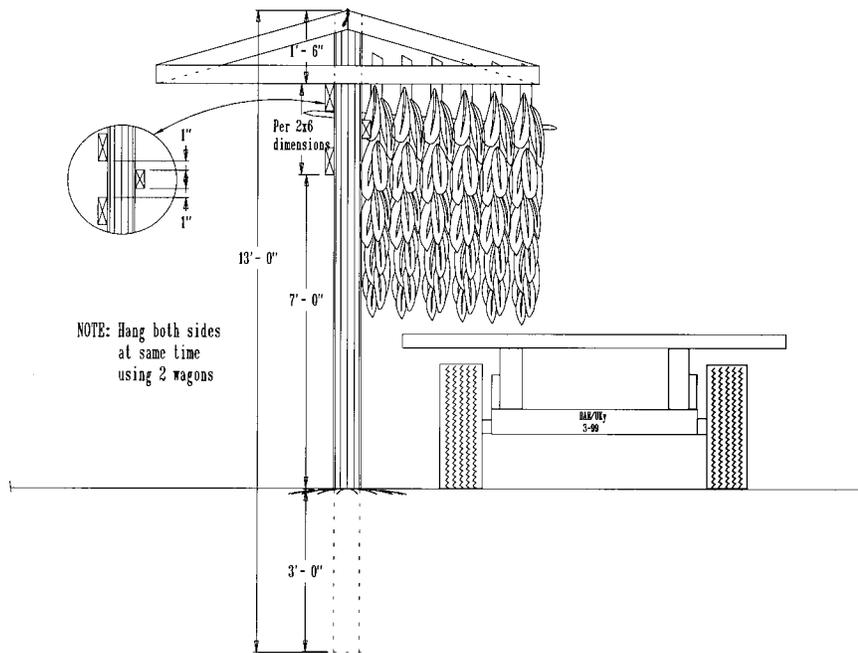


Figure 1. Construction for hanging directly from wagon bed

Dressed dimension lumber is about one-third weaker than full dimension lumber of the same species.

Dressed lumber of a strong species can be used for the stick support members if desired, but be cautious of dressed lumber of the weaker species if you intend to load the framework with heavy, tightly-spaced tobacco. Both sides should be filled at the same time with the weaker dressed lumber to maintain a balanced load and prevent undue stress and possible breakage (see the section on *Filling the Framework*).

TABLE 4: Relative Strength of Some Wood Species Compared to White Oak as Base of 100

Species	Relative Strength	Relative Stiffness	Density, Lbs/Cu Ft
Ash			
White	73	94	36
Black	102	69	31
Beech	109	100	40
Birch	109	100	39
Hemlock	80	69	25
Hickory	138	113	46
Oak			
Red	102	94	39
White	100	100	42
Pine, S.Y.	109	100	32
Poplar, Y.	73	69	25
Sycamore	80	75	31

Reference: USDA Forest Products Lab.

The height of the stick support members should be about 7 feet to fill the framework from a low wagon or trailer bed as shown in Figure 1.

The vertical space between the 2x4 and 2x6 members used for the stick supports should be about 1 inch to 1 1/8 inches so sticks remain fairly level or with a slight bow and droop (see the detail of Figure 1). This keeps the tips more level to clear the wagon bed during hanging.

The top “rafter” members for plastic anchorage and support need to be at the ends of each row of posts and as often along the row as you are willing to place them. Every third or fourth post is a recommended minimum with every second or third being a more secure anchorage of the plastic. The top two pieces are 1x4s set in a notch cut in the edge of the post so the 1x4s can lap the 2x4s for good alignment and nailing. Full dimension one-inch slats should allow a lathe strip to be nailed on top of the plastic to anchor it. Plastic cap nails are an option and

are showing potential for holding plastic quite securely against wind.

A top wire, rope, etc., is needed to support the plastic between the top frame members. Use a 2x4 on the side of the shorter posts to extend up to the required height. Bevel and round the edges of the 2x4 so it will not poke holes in the plastic, or use some piece of material (multiple layer plastic “patch,” etc.) for protection.

Stretch the wire, rope, etc. and secure it with one or two staples at each post position.

Filling the Framework

Filling the framework with tobacco is best done directly from the wagon or trailer bed as shown in Figure 1.

The wagons or trailers should be loaded from front to rear so that the framework can be filled beginning from the rear of the wagon. This allows the wagon to be pulled away from the tobacco as it is hung on the framework.

When filling, place a stick of tobacco into the supporting members far enough away from the last stick so the plants can be spread evenly on the stick and any folded leaves shaken loose. The innermost plant should be about 1 inch from a board, the outermost plant 3 to 4 inches from the end of the stick, and all others evenly spaced in between. Sticks normally should extend past the far side 2x4 or 2x6 about 3 to 4 inches.

When the plants have been evenly spread on the stick, move the stick toward the last stick to the spacing desired based on the size and condition of the tobacco.

IMPORTANT: A stick placed too close to the last stick before the plants are spread will likely result in tangled and jammed leaves and stalks when the plants are moved on the stick. Do not use this technique! Spread the plants, then space the sticks on the framework!

Be aware that tobacco wadded and/or jammed together will be the first to have high moisture curing problems due to inadequate air movement around each leaf.

Observe the ends of the sticks as you fill the framework to see that they remain fairly even and uniform along the framework.

Covering the Framework and Tobacco

When to Cover

IMPORTANT: The tobacco should be covered within the first week after hanging and *definitely* before the first rain of more than 0.1 inch! Once rain gets down in the closely spaced tobacco, it takes two or three days of clear weather to dry adequately.

If you get a rain on uncovered tobacco and cannot cover it until after the rain stops, leave it uncovered for several days if the weather is clear to dry the tobacco. Then cover it but leave the sides up for full ventilation until you can reach into the tobacco and feel *no free moisture or "wet" conditions*.

Plastic for Covering

Use *black 6-mil* plastic for toughness and durability in the covering.

The normal covering is 16-ft width plastic that would extend far enough to cover most of the tip leaves when hanging. Rolls of 16 x 100 ft waterbed plastic are readily available.

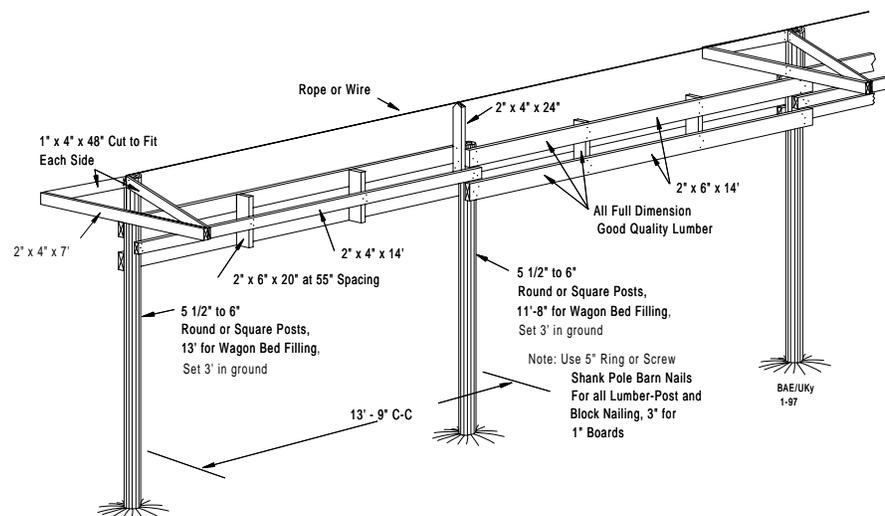


Figure 2. Perspective of framework showing lapped supports and other construction

How to Cover

Covering on a day with low wind velocities will make handling the plastic a lot easier.

Put a 10-ft long pipe or 2x2 through the roll of plastic and then nail each end to another 6 ft 1x4 or 2x4 so that a person on each side can walk along holding the plastic roll up over the framework and unroll the roll of plastic along

the top wire. Or use a pipe on a tractor front loader to unroll the plastic along the top as other workers pull the plastic down the sides.

Attach the first end of the plastic to the end "rafters" with lathe strips and 2.5 inch nails leaving 6 to 12 inches of plastic sticking out to lap down on any piece used to cover and protect the end.

Unroll and unfold the plastic as you move along the framework stopping at each set of "rafters" to align, tighten and secure the plastic with lathe strips and nails. Use step ladders, truck beds, tractor loaders, etc. to safely position workers high enough to align, hold, and secure the plastic.

The plastic needs additional securing by pushing it over a stick every 3 to 4 ft and tying baler twine around the end of the stick, over the top wire or rope, and to an opposite side stick to hold the plastic down.

An extra 2- to 3-ft length of twine should be left at each end to be used to tie up the side plastic to give full side ventilation when needed.

During normal to humid weather, leave the sides open for two to three weeks, then drop the plastic on the windward side to protect the exposed tobacco from further wind and moisture damage. Leave the other side open for ventilation to continue stem and stalk drying.

The ends can be left open for ventilation as the gable space tends to vent hot moist air out on sunny days.

Only in "dry" curing weather should both sides of the plastic be dropped from the first through the third week. Generally after three to four weeks, the tobacco is cured sufficiently that the sides can be dropped to give protection until the tobacco is removed for stripping.

Some may ask why cover the sides at all. In a humid weather season, the curing may be just as good with the sides fully open. However, there may be a few three- to five-day periods each curing season where cool, dry weather will overdry tobacco and set greenish and yellowish colors (piebald, variegated, mottled) which significantly lower the market grade and value. Also in about one of every four to five years the entire curing season will be rather dry and cause the tobacco to dry too fast.

On the other extreme, rainy weather will blow rain into the outside plants and cause blackened, leached leaves.

Consider this: If the outer plant on each side weathers enough to lose one-third of its weight and value (which is possible), then two-thirds of a plant out of 12 plants is a 5 percent crop loss. Surely preventing the potential loss of about \$250 per acre is worth \$40 to \$50 of plastic, some baler twine, and extra effort.

The bottom edges of the plastic can be held by tying a twine from the stick end down under the plastic and tobacco

and up to a stick end on the other side. Or nail long wooden 1x3s, 1x4s, 2x4s, etc. to the bottom edge of the plastic to weigh it down. Or use special “clips” to clamp the edge of the plastic or a 1- to 2-inch diameter ball with the plastic wrapped around it and a twine used to anchor either of these attachments to stakes driven in the ground. Other methods may be devised to secure the plastic equally as well or better.

Remember: The better the plastic is secured, the better its chances of staying on and protecting the tobacco during strong winds.

Removing the Tobacco

The cured tobacco should be removed and stripped as early in the fall as possible to reduce the potential for weather damage. **Early in-early out** is a good goal for field curing.

The cured tobacco can be removed and loaded directly onto a wagon, trailer, or truck for transport to a stripping area.

The tobacco is often in handling condition (“case” or “order”) on many mornings when there is dew and when other tobacco in barns has not had sufficient humidity to be handleable. Thus, there should be more opportunities to proceed with stripping.

Removing tobacco in drizzles and rainy weather should be avoided as wet tobacco in a bulk can quickly heat and damage unless opened up or stripped in a day or two.

Protecting the Framework

The plastic can be wrapped around the untreated wood members and tied with twine to give weather protection until the next curing season, thus prolonging the life of the lumber.

Materials per 96-ft Section

<u>Item</u>	<u>Quantity</u>
Posts, 13 ft	3 or 4
Posts, 11 1/2 ft	5 or 4
2x4x14 ft	9 ea
2x6x14 ft	14 ea
1x4x8 ft (cut to fit)	3 or 4 ea
2x6x20 inch blocks	14 ea
1/2x1x9 ft lathe strips	5 or 6
Wire or rope top support	97 ft
Nails, 5-inch pole barn	2 lb
Nails, 3-inch common	1 lb
Nails, 2 1/2 inch box	1/4 lb
Staples, 1 1/2 inch	10 ea
Plastic, 6-mil black, 16 x 100 ft	1 roll
Baler twine	Plenty

References

We wish to acknowledge the references below and research work that has provided a background for this report and the several farmers and County Extension Agents for Agriculture who have made adaptations and provided experiences that reflect on the guidelines presented.

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POST-ROW TOBACCO CURING STRUCTURE

Materials cost for a 96' section

OPTION 1: Rough sawed framing \$450 per 1000 board feet

Item	Cost/Unit	#	Total	Your Cost
POSTS				
14'-6x6 pressure treated	\$30.00	3	\$90.00	
12'-6x6 pressure treated	\$25.00	5	\$125.00	
			\$215.00	<input type="text"/>
FRAMING				
14'x2"x6"	\$6.30	14	\$88.20	
14'x2"x4"	\$4.20	7	\$29.40	
8'x2"x4"	\$2.40	3	\$7.20	
8'x1"x4"	\$1.20	3	\$3.60	
20"x2x6 blocks	\$0.75	14	\$10.52	
			\$138.92	<input type="text"/>
HARDWARE				
Pole barn nails	\$1.50	2lb	\$3.00	
16d nails	\$0.55	1lb	\$0.55	
10d nails	\$0.55	.25lb	\$0.14	
Staples	\$0.75	.25lb	\$0.19	
Wire or rope (100')			\$5.00	
			\$8.88	<input type="text"/>
COVERING (replaced each year)				
6mil plastic, 16'x100'	\$45.00	1	\$45.00	
Twine, several hundred feet			\$2.00	
Plastic cap nails	\$13/1000	75	\$1.00	
			\$48.00	<input type="text"/>
TOTAL COSTS			\$410.80	<input type="text"/>

Annual costs per acre of capacity assuming:
5 year life of frame and
1250 sticks per acre

Stick Spacing (in.)	Acres per 96' Section	\$/Ac/Yr
5.5	0.32	\$376.75
5.0	0.35	\$344.45
4.5	0.40	\$301.40
4.0	0.44	\$274.00

POST-ROW TOBACCO CURING STRUCTURE

Materials cost for a 96' section

OPTION 2: Pressure treated framing

Item	Cost/Unit	#	Total	Your Cost
POSTS				
14'-6x6 pressure treated	\$30.00	3	\$90.00	
12'-6x6 pressure treated	\$25.00	5	\$125.00	
			\$215.00	<input type="text"/>
FRAMING				
14'x2"x6" pressure treated	\$10.30	14	\$144.20	
14'x2"x4" pressure treated	\$7.20	7	\$50.40	
8'x2"x4" pressure treated	\$3.00	3	\$9.00	
8'x1"x4" pressure treated	\$2.10	3	\$6.30	
20"x2x6 blocks, pressure treated	\$1.25	14	\$17.50	
			\$227.40	<input type="text"/>
HARDWARE				
Pole barn nails	\$1.50	2lb	\$3.00	
16d nails	\$0.55	1lb	\$0.55	
10d nails	\$0.55	.25lb	\$0.14	
Staples	\$0.75	.25lb	\$0.19	
Wire or rope (100')			\$5.00	
			\$8.88	<input type="text"/>
COVERING (replaced each year)				
6mil plastic, 16'x100'	\$45.00	1	\$45.00	
Twine, several hundred feet			\$2.00	
Plastic cap nails	\$13/1000	75	\$1.00	
			\$48.00	<input type="text"/>
TOTAL COSTS			\$499.28	<input type="text"/>

Annual costs per acre of capacity assuming:
7 year life of frame and
1250 sticks per acre

Stick Spacing (in.)	Acres per 96' Section	\$/Ac/Yr
5.5	0.32	\$351.46
5.0	0.35	\$321.34
4.5	0.40	\$281.17
4.0	0.44	\$255.61

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