# 12. Burley Curing and Market Preparation

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As burley tobacco producers face higher costs for some inputs and the added risks of no price-support program, they feel greater pressure to hone their production, marketing, and general business skills to make their burley enterprises "work harder" to generate profits. As a result, making sound management decisions regarding curing and market preparation is more critical today than ever before. All production costs must be contained while the producer strives to optimize burley quality to obtain the best possible prices and improve net income, or at least maintain profit levels. This chapter is a discussion of curing and market preparation aspects and strategies that are directed toward the goal of marketing a high-quality, profitable burley crop.

## The Curing Process

Curing refers to the numerous chemical and physical changes that occur in tobacco leaves after harvest. The curing environment determines the nature of these changes and has a substantial impact on the quality and received price of cured tobacco. The curing environment primarily refers to temperature, relative humidity, and air exchange or ventilation.

The preferred curing environment for burley tobacco provides temperatures that stay within the range of 60 to 90°F, and a relative humidity that averages about 65 to 70 percent over any 24-hour period. In most seasons, the key to successful curing will be maintaining this desired relative humidity in the curing structure with enough ventilation to prevent stagnant air conditions. The ability to control moisture (and, in some cases, temperature) inside the curing structure is critical to producing high-quality burley each year.

Controlled ventilation is the primary means of managing the curing environment. Stagnant, moist air contributes to *houseburn* or *barn rot* more than circulated, fresh, moist air. At the opposite extreme, excessively low relative humidity levels can result in rapid drying and undesirable leaf color and smoking characteristics. Furthermore,

recent research results on leaf chemistry suggest that curing management practices that rely on optimum, recommended moisture and ventilation ranges will often keep levels of some undesirable chemical compounds, such as tobacco specific nitrosamines (TSNA), from increasing in cured burley leaf.

*Curing Stages*

Curing is a continuation of the ripening process that primarily involves nutrient starvation and moisture reduction. The curing process can be described in three stages:

*The first is the yellowing stage.* During yellowing, the leaf color slowly changes from shades of green to yellow, while the stems or midribs remain green. The yellowing stage generally lasts from one to three weeks, depending on the ripeness of the tobacco, the weather conditions, horizontal spacing between sticks in the barn, vertical spacing between tiers, whether the tobacco was field-wilted, and the kind, size, and shape of curing structure used.

If the yellowing stage progresses too quickly (as a result of extended periods of low relative humidity, especially if accompanied by excessive ventilation), an undesirable leaf color will be set. This is generally a mottled or variegated bright color (often called *piebald*, *pawpaw*, or *K-tobacco*) if the temperatures are warm and a green color if the temperatures are cool during rapid drying. If the yellowing stage progresses too slowly (from high moisture, especially under poorly ventilated, stagnant air conditions), houseburn or barn rot will develop. Houseburn can reduce the weight and quality of the cured leaf and possibly cause increased development of undesirable levels of chemical compounds in the leaf, such as TSNA.

*The second stage of curing is the leaf-drying stage.* During this period, the leaf lamina or webbing gradually changes from yellow to a dark color (typically brown, tan, or reddish brown).

*The third and final stage is the stem-drying stage.* During this stage, stems shrivel in size and lose most of their moisture. Once all the "fat stems" or "swelled stems" are dry, the curing process is essentially completed and stripping can begin. The curing process gradually proceeds from the ground leaves to the top leaves. However, there is some overlapping of the three curing stages from the bottom to the top leaves on the stalk.

## Managing the Curing Environment for Quality and Yield

The ability to control moisture and air circulation (and in some cases temperature) inside the curing structure are critically important to producing burley tobacco of high physical and chemical qualities each year. Housing and curing costs are affected by many risky variables, only some of which the producer can control directly. Besides lowering costs, a producer's major objective is to maintain the yield and quality of the uncured tobacco coming out of the field.

### *Controlled Ventilation*

Controlled ventilation is the basic means of managing the curing environment. In conventional barns, as a rule of thumb, ventilators and doors should usually be opened during the day and closed in the late afternoon or early evening. However, if the tobacco is curing too fast due to dry weather (relative humidity is well below 65 percent for a 24-hour average), the barn should be closed during the day and opened at night. On the other hand, if the tobacco is curing too slowly due to high moisture levels (excessive humidity, prolonged rainy periods lasting more than 24 hours, or both), the barn must be kept open to provide ventilation. Stagnant moist air is more of a problem than circulated, fresh, moist air. In some extreme cases, circulation fans and supplemental heat will be required to prevent houseburn or barn rot.

### *Low Heat*

Low heat reduces the relative humidity without adversely affecting leaf color. Excessive heat can lower the relative humidity too much, resulting in rapid drying and undesirable leaf color. Supplemental heat in burley tobacco barns should be generated by vented stoves (ones that burn propane, LP gas, natural gas, or low-sulfur coke), but never by open fires that can smoke the tobacco. Some ventilation will still be required when supplemental heat is used to allow moisture to escape from the barn. Otherwise, condensation is created that defeats the purpose of the additional heat. Adjust the stoves so the temperature at the lowest hanging tobacco directly above the stoves does not exceed about 85°F. Circulation fans are another way of controlling moisture in the curing structure during periods of prolonged rainy weather or excessively high daytime humidity.

*Hanging Density and Side Covers*

Fifteen years of research at the University of Tennessee have shown that burley tobacco can be hung at higher densities in open-sided low-profile curing structures without increasing the danger of houseburn or barn rot over that in sided, taller, conventional barns. Higher densities mean lower barn cost per unit of cured tobacco.

In field-curing structures (Figure 12-1), the curing environment is controlled primarily by the hanging density (spacing between sticks) and by *side cover* management. Sticks can and should be spaced closer together in these structures than in conventional barns. An average spacing of 3½ to 4½ inches generally works well, depending on how large the tobacco is, how much wilting has occurred, and the prevailing weather conditions. Polyethylene covers should be placed over the structures soon after hanging. However, if the leaves are wet, allow them to dry before covering.

The *gable ends* of field-curing structures should always be open. The side covers should generally stay up or open during the yellowing and leaf-drying stages and then should be dropped for completion of curing. One exception to this rule of thumb occurs during prolonged periods of warm to hot temperatures and low relative humidities that last for several days or more. Under these conditions, the side covers should be lowered during yellowing and leaf drying to slow the curing

***Figure 12-1. Two-rail field-curing structures***

process and to minimize undesirable variegated color. Once the side covers are lowered, close monitoring of the interior stalks of tobacco is necessary to detect potential houseburn conditions that require temporarily raising the covers. This management step is especially important for field structures that are three or more tiers wide.

*Curing Structure*

Using low-profile structures appears to result in cured burley that is darker and redder than burley cured in taller, enclosed, conventional barns. This has been observed both in long-term research and by producer experience under good curing management situations. Industry acceptance of well-managed burley cured in these structures has been quite good.

Open-sided low-profile barns and structures are good for curing but not for storing unstripped cured tobacco. The tobacco should be removed (stripped or packed down) from polyethylene-covered field-curing structures as soon after curing is completed as possible. Timely takedown will minimize leaf shatter, excess moisture damage to tip leaves, and the risk of sticks blowing out of the structure.

Housing and curing management practices must be customized and directed at preserving yield and quality in each curing structure because every structure and every crop are different. Each structure

***Figure 12-2. Two-tier low-profile barn***

is somewhat unique in its curing characteristics and needs to be uniquely managed. Field-curing structures generally require more management, but also allow for better management of the curing environment than most conventional barns.

An often-asked question is, "Which barn or structure is best?" The answer is that no one barn or structure is necessarily the best. The fact that polyethylene-covered field-curing structures are the lowest cost, as a group, does not mean that a producer's whole crop should be cured in such structures; they are poor facilities for storing cured tobacco for extended periods because of weather risks. If a producer cannot strip tobacco as it cures, then a better facility with a good roof and perhaps some partial or complete side protection from the elements would be more appropriate than a plastic-covered field-curing structure for storing part of the unstripped, cured crop. For example, a conventional metal-covered, gable-roof, low-profile barn (Figure 12-2) would be a better choice for adding this weather protection. Also, a tall, enclosed, conventional barn (which one might already own) hung one or two tiers high at a higher density than normal (to get some of the labor and cost advantages of the low-profile approach) offers excellent weather protection for cured tobacco that will be stripped and graded later.

Many producers may conclude that it is best to use both low-cost structures that provide minimal weather protection as well as structure(s) that are built better, but are more expensive to own and operate. They may decide that this approach would offer labor and time flexibility and help manage weather risks inherent in producing burley. In some cases, compromising on cost efficiency to gain flexibility, improve timeliness, and reduce risks can be justified as an excellent management strategy to preserve or even improve net income in an uncertain production environment.

## Market Preparation

Market preparation practices are some of the key determinants of burley quality. Proper management of these practices contributes greatly to profitability because market preparation requires about half of the total labor in a burley crop. Maximizing the efficiency of one's market preparation system by keeping costs per pound of tobacco as low as practical is an important management strategy.

*System* is the key word. *System* means that all the various tasks associated with market preparation (such as takedown, transport,

stripping, baling, bale handling and storage, stick removal, stick handling and storage, and stalk disposal) are linked together in ways that minimize unnecessary labor, such as wasted steps, downtime, handling the tobacco more times than necessary, long-distance carrying, inefficient space utilization, not having tobacco in order or case, and so on. A *market prep system* is an orderly, efficient flow of the entire market preparation process, very much like a factory assembly line.

Recent studies at the University of Tennessee Tobacco Experiment Station have shown that making the system efficient is actually more important than selecting the right system or the right stripping equipment. There is no magical piece of equipment that will guarantee efficiency in market preparation. Even stripping aids, such as the stripping wheel, the carousel, and the stripping chain conveyor, cannot guarantee improvements in efficiency. The conventional relay method of stripping-grading actually competes very well in efficiency with these semi-mechanized stripping aids when the system is made efficient by implementing a few key principles. This is an important change in perspective from previous studies.

What are some of the key concepts involved in maximizing efficiency in market preparation while at least maintaining or even enhancing tobacco quality?

### *Key Concepts*

*Understand that there is no single correct method of efficient market preparation.* The objective is to customize one's operation to make it as efficient and quality oriented as possible within given conditions or limitations that cannot be changed.

*Handle tobacco in bulk quantities.* This applies to several steps in the process. Here are two examples: (a) Take down as much tobacco as possible when it is in proper order or case after the stalks are no longer green (the risk of heating from the moisture in the still-green stalks is significant in bulk piles, whether on or off the stick). Tobacco on the stick can be taken down on 5-foot by 8-foot flat wooden pallets, wagons, scaffold trailers, or other transportable devices that can be safely stored until stripping. (b) At stripping, workers should gather as many leaves in their hands and arms as practical before placement in the bale boxes to minimize worker motion and effort.

*Organize the layout of the stripping area.* The tobacco should be moved in a logical, efficient flow that minimizes walking and handling. For example, the "pile" of unstripped tobacco should be close to the stripping area, and the bale boxes should be no more than an arm's length from the people doing the stripping-grading. Wagons, trailers, sticks, pallets, stalks, and bales should not be moved against the flow.

*Consider worker comfort.* For example, floor cushions or pads, or slatted floors, can improve worker production in many cases. Minimize stooping, reaching, dust, and so forth. Provide heat if necessary to maintain a temperature of about 55 to 60°F. Provide adequate lighting, especially at the stripping areas. A comfortable work environment is a productive work environment.

*If necessary, prioritize tasks.* For example, some systems keep the stalks on the stick during stripping. In this case, if the time when tobacco is in order or case is limited, consider removing the stalks from the sticks later when stripping is not being done. This points to the value of the next principle.

*Increase your control over when tobacco is in order or case.* When relying on natural weather conditions to order or case tobacco, there are times in every stripping season when market preparation must be stopped simply because tobacco is too dry to handle. The value of large-quantity takedown has already been mentioned. In addition, having an ordering or casing room can greatly improve efficiency and timeliness in most operations. Humidifiers (commercial or homeowner types) placed in a tight room or building can bring tobacco placed on pallets, scaffold trailers, or wagons into workable order or case overnight if enough heat is provided to maintain a temperature of about 55°F.

This discussion is not to imply that other factors or principles associated with market preparation are unimportant. These, however, are clearly some of the key ingredients in improving efficiency. Efficiency is not the only issue that is important to market preparation. There are several others that are critical to product integrity and long-term market viability.

## Grade Separation

Burley tobacco should be separated or sorted into at least three grades by stalk position. In addition, a cull or throw-out grade should be established, if necessary. For some tobaccos, buyers would actually prefer four grades. In today's market, price incentives certainly favor separation. The bottom line is that tobacco should always be separated by stalk position. It is the way quality tobacco is supposed to be handled; it is insurance against discounts for, or outright rejection of, mixed-grade tobacco; and it helps sustain demand (short-term and long-term) for U.S. burley. Current burley markets reflect the importance of grading by stalk position. Quality is the only market niche that U.S. tobacco has. The declining market share of U.S. burley will be further jeopardized if U.S. producers disregard their competitive advantage in quality.

### *Moisture Content*

Tobacco with excess moisture will spoil quickly. Current use of moisture testers and rejection of substantial amounts of excessively moist tobacco over the last two years strongly indicate that buying companies are taking a tougher, more quality-conscious stand against excess moisture in burley tobacco. This approach makes sound business sense not only for the buying companies, but for producers as well. Selling burley with known moisture content in bales that weigh no more than 80 to 90 pounds each should help sustain and perhaps improve the marketability of U.S. burley tobacco. Recent evaluations suggest that a moisture content of about 18 to 23 percent is acceptable. Contracts generally call for baled tobacco to contain no more than 23 to 24 percent moisture.

### *Product Uniformity*

As the focus on growing and selling a quality product increases and as buying companies hedge their liability risks by greater knowledge of the tobacco they buy, selling bales and market lots (piles) of uniform tobacco is important. Nonrepresentative display bales, bales of inferior tobacco mixed in a pile of better tobacco, and bales nested with inferior tobacco or non-tobacco-leaf substances (such as suckers and stalks) and other non-tobacco items—all make for a non-uniform, lower-quality product that will increasingly be viewed as a liability against top dollar, future purchasing contracts, and market viability.

*Misuse of Pesticides*

The tobacco companies and dealers that buy U.S. tobacco also sell U.S. tobacco, either as processed leaf or as manufactured products. To make these sales, there must be a demand for those particular products. More and more foreign countries are imposing residue restrictions from many labeled (and, of course, unlabeled) pesticides. In other words, pesticide residues are a marketing issue, which makes the on-farm recording and management of all pesticides used on tobacco very important. The solution to this issue at the grower level is simply to make sure that these standards are followed:

1. All pesticides (fungicides, insecticides, herbicides, and suckercides) used on tobacco are specifically labeled for use on burley tobacco.
2. All pesticides are applied according to label directions with regard to rate, timing, and pre-harvest interval.
3. Dates and rates of applications are recorded.

Each producer has a stake in a continuing if not stronger demand for U.S. burley tobacco to help ensure a viable future for tobacco farming. Additional information on curing and market preparation is available at **http://tobaccoinfo.utk.edu**.