

FACTSHEET: TOB-4-09

Burley Tobacco Curing Advisory

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As we progress through this year's tobacco harvest season, it is important to keep in mind the management techniques required for proper curing of tobacco. Wet weather in the spring delayed planting and wet weather this fall has delayed harvest such that a significant curing management is to promote the environmental conditions of moisture and temperature that optimize the curing process to produce the best quality leaf for processing. Beyond the curing facilities location and design phase, there are three main management inputs that affect curing: 1) how the harvest is scheduled, 2) how the tobacco is hung, and 3) controlling ventilation in barns or other curing facilities to affect relative humidity and air movement through the tobacco. This advisory is intended to review the basic principles of air curing tobacco to help growers optimize the curing process. In addition, timely information specific to late harvested burley tobacco is presented.

Timely Information

1. Much of this year's crop is large, wet, turgid tobacco such that it will need more space for curing. In particular, growers need to watch the overlap, not shingling the green tips of one rail in contact with the drier flyings of the next rail, because that is where houseburn generally starts. See the section on Managing the Curing Process for more specific stick spacing recommendations.
2. Contracts/buyers are likely to be more critical on quality this year because of the expected increase in tobacco supply combined with a likely reduction in demand due to the economic downturn. Growers should manage curing carefully to get the best leaf quality.
3. As the consolidation of production continues, growers with large acreages may become more interested in technology that can help them better control environmental conditions for both curing and conditioning tobacco. Various publications with information on the use of fans, relative humidity measurement instruments, and steamer/humidifiers are available from the UK Biosystems and Agricultural Engineering Department web site at www.bae.uky.edu/Publications/EXT/pubs_Tobacco.htm.
4. Delays in planting and harvesting mean that much of the crop will be cured later than normal resulting in additional curing challenges. Average daily temperatures below 50°F during the first two weeks of curing may result in greenish cast to the cured leaf color.

Review of Curing Basics

The process of air curing burley and dark tobacco changes the tobacco leaf's chemical

and physical properties from the green and yellowish stages to tan and brown aromatic leaf for processing. Most of the changes occur during the first four weeks of curing (approximately two weeks for yellowing, two weeks for browning) and alter many compounds in the green leaf.

Burley's quality is influenced by moisture and temperature conditions inside the curing facility during the curing period. Steady or average daily humidity in the 72-75% range is considered optimum for producing the quality of tobacco leaves currently desired by the industry. The optimum temperature is considered to be in a range of mean daily temperatures from 65 to 90°F. Note that the mean daily temperature and relative humidity is the average of the high and low for the day, so the temperature and relative humidity can be proper for good curing even if the extremes are well outside the accepted range. During the normal late August and September curing season in Kentucky, the temperature generally stays within the optimum range. The relative humidity tends to cycle considerably outside the optimum range on a daily basis, from near 100% during heavy dew and foggy nights and dropping to 40-50% during the heat of the day. The average or mean relative humidity, however, tends to remain in that optimum range of 70-75°F.

During curing, the tobacco is undergoing a drying process as it exchanges moisture with the ambient air until the moisture content of the leaf is in equilibrium with the relative humidity of the ambient air. Relative humidity, airflow, and temperature interact to affect drying of tobacco. Of the three, airflow is main one we can control during curing, by opening and closing ventilation openings in the barn. A good burley barn has $\frac{1}{4}$ to $\frac{1}{3}$ of the sidewall as ventilator openings. To get the best leaf characteristics resulting from the curing process, we do not want the tobacco to dry too fast. During dry conditions, we can slow the drying process by closing ventilation. Very humid and hot weather can lead to "houseburn," resulting in a dark leaf with excessive loss in dry weight (due to the action of microorganisms that cause soft rot). In houseburning weather, we want the tobacco to dry as much as possible, so the ventilators should be kept open to increase airflow.

Managing the Curing Process

As mentioned previously, the main management inputs that affect curing are harvest scheduling, how the tobacco is hung, and controlling ventilation/airflow. As far as scheduling, early to mid-August is not the best time to be hanging tobacco in barns because the hot, humid weather and low wind velocities both day and night are not good for moisture removal and curing of freshly housed tobacco. These conditions can promote houseburn. The moderate temperatures and lower humidity of late August and throughout September are better for good curing of burley. So, if you can manage to wait until early to mid-September for cutting, you have a better chance of good curing conditions. Also, it is best to schedule cutting so as to get maximum field wilting time for moisture and weight loss. Field wilting for a few days results in considerable moisture and weight loss, resulting in both better handling and curing.

Tobacco should only be housed when the dew, rain, and other surface moisture has completely dried from the plant. Surface moisture can quickly cause houseburn problems. It is important that the plants be shaken out and spread on the stick to untangle leaves when

positioning the stick on the rails. Sticks should be hung to allow space between plants for air circulation and moisture removal. For closely spaced rails where tobacco will likely overlap, stagger and space sticks so the green tips of one rail will not be shingled in contact with the drier flyings of the next rail. With large tobacco plants, especially close attention should be paid to this potential overlap. For barns with tier rails less than 4 ft apart vertically, you might want to skip every other rail vertically and hang the tobacco closer on the rails to prevent this overlap. Sticks should be spaced as far apart as possible on the rail for good natural ventilation, depending on the crop size and barn space available. Generally, a stick spacing of 10-12 in. is used for taller conventional barns with tier rails spaced 3½ to 4 ft apart, 7-8 in. for the three-tier air cure barns with 4½-5 ft vertical tier rail spacing, and 6-7 in. for the special two-tier forced air designs with 5-5½ ft vertical spacing.

For normal, humid weather conditions during the first 2 to 3 weeks of curing, leave ventilators and barn doors wide open to maximize air movement, except to protect tobacco from blowing rain. After the first 3-4 weeks of curing, the leaf lamina becomes mostly brown and fairly dry, and the “fat” midribs also are beginning to dry. At this time, you can begin to close the doors each night to reduce humidity entering the barn. Open the doors each morning to continue the daily drying progress.

Tobacco harvested in late September or early October presents additional challenges for curing. If the weather is especially dry during the first 3-4 weeks, the tobacco may dry too fast, causing a greenish or “piebald” color to be set in the leaf. If this is the case, close all doors in the daytime to retain all moisture possible and open at night to let any humidity in the barn. Cool, dry, windy weather during late September and early October can cause abnormally fast curing, resulting in a greenish color being set in leaves that are still in the green or yellow-green stage. Whenever the air temperature drops below 60°F and tobacco is still in the green and yellow stage of curing, the ventilator doors should be closed to reduce the effects of this “cold” weather. During periods of high humidity ventilators should remain open.

Curing in Field Structures

Tobacco hung in field structures is much more open to air movement than that in barns, and there is no way to close off air movement to much of any extent in an attempt to hold moisture in. The only possibility for control is raising and lowering overhanging plastic on the sides of plastic-covered field structures. The only real benefit of lowering the side covers will be to protect the tobacco from wind and rain damage, which can severely darken and deteriorate the outer leaves (but often does not seriously affect market price).

Fortunately, natural conditions in Kentucky have proved to be conducive for good curing in field structures despite the openness and lack of control. Apparently, because of the openness and the fact that the tobacco is hanging over grass, the moisture is better able to move into the hanging tobacco during the night than in barns. In the daytime, it is better if the side covers are left open because when they are down, the extra heat generated by the black plastic causes the enclosed area to get hotter, contributing to excessive drying. A compromise between actively raising and lowering the sides daily is to leave the windward side covers longer, for protecting the tobacco from stronger winds and rain, but leave the leeward (downwind) side open for moisture penetration at night.

It is best to locate field structures to provide some shelter on the windward side, like from a barn or fencerow, to provide some protection from storms and heavy winds to reduce the chances of the plastic cover getting ripped off. Field structure covers should be kept in place throughout the curing season. If plastic covers are torn off, they should be replaced.