Stripping and Preparation of Tobacco for Market

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The market preparation phase of tobacco production involves the removal of cured tobacco from the curing facility, temporary bulking, removal of leaves from the stalk (stripping), grading by physical characteristics, and packaging for market.

Takedown and Bulking

Tobacco should not be removed from the curing facility until all the stems (midribs) of the leaves have dried to a firm condition (not "fat" or "mushy"). Takedown and bulking are the processes of removing cured tobacco from the curing structure and consolidating for access by workers or transport to a remote stripping location. Tobacco that must be transported to the stripping location can be consolidated onto a scaffold wagon or bulked onto a flatbed wagon, truck or trailer. Tobacco should be bulked on a clean, dry surface such as wooden boards, pallets, a wagon bed, or similar surface. A plastic sheet can be used as a protective barrier onto which the tobacco can be bulked, but be aware that a layer of moisture can condense on plastic under certain atmospheric conditions. Periodically check tobacco in contact with plastic to detect any moisture problems.

Tobacco must be in a pliable condition for handling and bulking, which is often referred to as being in "order" or "case" and occurs with exposure to an environment of 70% or higher relative humidity for several hours (four to 12 hours, depending on the temperature). Producers typically wait for natural weather conditions of good humidity and temperatures above 35°F for conditioning the tobacco for handling. In extreme dry periods, steamers or overhead misting systems (in dark-fired barns) can be used in barns that are somewhat airtight for artificially conditioning tobacco for handling.

Tobacco in equilibrium with air below approximately 60 to 65% relative humidity will be so dry that leaves will likely shatter when handled, thus losing quality and weight. Conversely, exposure to a continuous relative humidity of greater than 85% will cause the tobacco to become too moist and subject to deterioration and damage when bulked or baled. High-moisture tobacco will "heat up" in the bulk after a day or so in warmer weather (above 50 to 55°F daily average), causing undesirable mold development, a bad smell, potential discoloration, and, in a worst-case scenario, rot.

No inexpensive tool yet exists for growers to quickly and accurately determine the moisture content of cured tobacco. Such a tool could significantly benefit growers in managing their stripping and baling operations to minimize problems related to moisture content. Currently, grower experience is the best tool for determining moisture content of cured tobacco. A leaf in proper order will yield without crumbing when squeezed in the hand but should spring back slightly after being released. The base of the stem should remain brittle and snap or break when doubled over. Indications that leaf moisture may be too high for safe baling are when the leaf remains compressed even when released, and when the stem is completely pliable even when doubled over.

Several different methods are used for bulking tobacco. Tobacco can be bulked either with sticks still inserted or removed. Bulking with the sticks inserted is often a method used early in the fall to provide better air and moisture diffusion from the bulk when the stalks are still "green" and moisture laden. Stick bulking can also make it easier to handle the tobacco at the stripping location. Removing the sticks when bulking can be done when the stalks are dry enough (general brown color) that the moisture will not cause "heating" or other problems when the bulked stalks are tightly packed for several days of warm weather (above 45 to 50°F daily average) before stripping. If the stalks are still green and moist when bulked, strip within two to three days. Put wooden sticks between bunches of stalks to permit better ventilation and moisture diffusion when bulking for an extended period.

In any bulking method, place your hand deep into the bulk daily to determine that the tobacco is still cool and not beginning to heat up. If warmth is detected, then prepare to strip the bulk promptly, open the bulk, or move the tobacco around to air out. If heating occurs, moisture level should be reduced before baling.

If dust or other contaminants are not prevalent, the bulk of tobacco can be left uncovered in mild fall weather to allow moisture diffusion. Later in the cooler and drier fall or winter weather, a tarp or plastic cover can be put loosely over the bulk to protect it from excessive drying and prevent dust accumulation or other contamination.

Tobacco can also be taken down and put on scaffold wagons until stripping if wagons and storage space are available. In warmer fall weather, tobacco taken down onto scaffold wagons will be less likely to heat and does not have to be stripped as quickly as it would if it were bulked. The entire scaffold wagon can be loosely covered with plastic to retain moisture until the tobacco can be stripped.

It is very useful to have an "ordering/casing room" with heat and humidifiers available and adequate sealing to control humidity. With this setup, tobacco bulked down on wagons or pallets or hung on scaffold wagons can be brought into proper order overnight for stripping the next day. Having this capability can help minimize the downtime often experienced during dry periods in the fall when the natural relative humidity is too low to bring tobacco into proper order. The ordering room should be large enough to hold at least one-day's supply of tobacco for stripping.

Stripping Burley

Stripping is the process of removing and grouping leaves by stalk position and physical characteristics to meet marketing requirements. A full-leafed mature burley plant can have 20 to 24 leaves. Producers who strip their tobacco into four grades typically grade into the four stalk-positions—flyings (also referred to as trash), lugs (cutters), leaf, and tips—that are true to former Federal Grade standards. Properly done, this grouping will be acceptable to all buyers, but some buyers may not care about a separate flyings grade or a true tip grade and will not pay a premium for them. In this case, it could be more profitable for the producer to strip the crop into three grades.

Company specifications for grading tobacco can vary significantly; therefore, growers should review their contracts and talk with company representatives regarding their specific requirements. Some buying companies require only three grades. Often weather, soil, and curing variations are such that only three distinct grades of leaf characteristics may exist on most plants. Over-mature harvest and/or loss of lower leaves during harvest may reduce the lower stalk position (flyings or trash) group. Several of the newer burley varieties maintain such sound lower leaves that a true flying may not be produced. Growing conditions, agronomic practices, and variety may also limit the number of true tips that can be produced. Stripping of these plants into three grades might be accomplished without significant loss in value if the marketing process permits. Past studies have shown that the labor cost to remove a fourth grade of limited quantity and value is not always economically feasible (Bridges et al., 2006).

The traditional stripping methods of growers who put tobacco into three grades often result in mixed grades from the buying company standpoint. As the companies make their blends, they look for specific characteristics that differ from grade to grade. Tobacco companies can use a small percentage of mixed-grade tobacco, but the handling characteristics of the basic stalk positions differ substantially during processing. Even companies that only require three grades do not want a mixed grade of lighter lower stalk tobacco (cutter) with heavier-bodied upper stalk tobacco (leaf). Tobacco stripped into three grades is typically grouped into flyings, lugs, and a leaf/tip grade. With three-grade tobacco, producers tend to strip too high on the first grade (lower stalk) for a true flying grade but not high enough to get a good separation between lower stalk and upper stalk tobacco in the second grade. Generally, they put too many leaves into the third grade for a true tips grade. Thus, three-grade tobacco often will have a mixture of flyings and lugs in the first grade, a mixture of lugs and leaf in the second grade, and may have a mixture of leaf and tips in the third grade. Depending on the buying company, the first grade and third grade in this type of stripping may be acceptable, since the first grade is clearly all light-bodied lower stalk tobacco and the third grade is all heavier bodied upper stalk tobacco. However, the mixed middle grade will be a problem for all buyers. This may reduce market quality grades from 1's or 2's to 3's, and the mixed middle grade may be classed as cutter instead of leaf. This reduction in quality grade has happened quite a bit with some of the lighter-colored, thin-bodied crops produced in dry years. If the mixed nature of the middle grade leads to a C3 grade, this can be quite costly for the producer compared to a more careful separation of lower and upper stalk tobacco. Generally, companies that want tobacco stripped in three grades want all flyings and cutters in the first grade, lighter bodied leaf in the second grade, and the shorter, darker heavier bodied leaf and tips in the third grade.

Some tobacco company contracts that require four grades use a very strict definition of tips and/or flyings, which means fewer leaves in these grades compared to the way tobacco farmers have normally stripped. One such crop throw would typically put only one to three leaves into flyings (trash), five to seven leaves as lugs (cutters), half of the stalk (10 to 12 leaves) as leaf tobacco, and the remaining two to four leaves as tips. Again, growers should review their contracts and check with company representatives for a clear understanding of how the buyer wants the tobacco separated into grades.

The predominant means of leaf removal is still by hand methods, with the relay method generally being the most used and still predominant on small and medium sized farms. The relay method uses workers along a bench 32 to 34 inches high or wagon bed, with a source (pile) of cured plants at one end. The first worker pulls the lowest grade and lays the stalk on a pile for the second worker to remove the next grade and so on until all leaf grades have been removed. The stripped leaves are generally placed on the table or in a receptacle (tray, box, etc.) adjacent to the worker so another worker can conveniently gather the leaves for baling and carry out other support tasks such as removal of stalks and bringing in more plants. For handling into the now-predominant big bales, large plastic hampers, heavy-duty cardboard boxes, vegetable bins, or burlap sheets are being used to accumulate leaves of each grade before "big baling."

Another manual method of hand stripping involves each worker removing all grades from a plant, placing the leaves in separate receptacles, and placing the stalks in a "stalk rack." Other workers collect and carry the leaves and stalks to appropriate boxes, sheets, balers, or wagons.

Bare stalks accumulated at the end of stripping are periodically carried to a separate wagon, manure spreader, or similar vehicle for later transport to a field for spreading and disposal. Stalk choppers and conveyors for removing the stalks have been adapted by some producers (see Burley Harvest and Stripping Mechanization on page 63 for further information about stalk choppers).

With the predominant use of big baling and the non-oriented leaf packaging that it allows (see "Burley Baling" below), many growers have found that different mechanical stripping aids help improve the efficiency of their stripping operations. Stripping aids such as the stripping wheel and various types of straight-line conveyors that move the stalks past the workers allow them to use both hands for faster removal of leaves from the stalk. These aids seem to work well with the larger scale stripping operations often used to accommodate single or multiple big balers. Chain conveyors which move tobacco still on sticks past workers have particularly gained popularity on larger burley and dark tobacco farms. Studies done in the 1990s when stripping wheels were introduced showed mixed results in terms of how much these and other stripping aids improved efficiency. Efficiency gains ranged from a small percentage up to 30 to 40%. However, these studies were done with small bales, so that the stripped tobacco had to be oriented in small batches in bale boxes. With large bales and non-oriented/tangled leaves, producers seem to find the various stripping aids more advantageous. Some producers are incorporating flat belt conveyors into their stripping operations to move leaves to the baler.

Other growers are finding different setups for incorporating big balers into their stripping operations are more useful than stripping aids. Studies at the University of Tennessee showed that being well organized in carrying out various auxiliary tasks was more important to labor efficiency. Keys to increased productivity with stripping aids and other systems are to make sure that each worker performs efficiently as part of the team, tasks are reasonably balanced or staged in terms of time required per worker-task, and the flow of tobacco and stalks in and out is smooth and efficient, with minimum distance required for human handling. Examples of stripping room layouts with various options for handling loose leaf tobacco prior to baling can be found at: https://www.uky.edu/bae/sites/www.uky.edu.bae/files/StrRmLys.pdf.

Burley Baling

The small conventional bale of oriented leaves with air cylinder compression in wooden boxes (an industry standard since the 1980s) has now largely been replaced by tangled-leaf big tobacco bales. Studies done at the University of Kentucky and the University of Tennessee have found improvements in labor efficiency ranging from 15 to 25% with the use of big bale packaging, and many growers feel that they have achieved similar savings. Most big balers use hydraulic cylinder compression to form the bales in the nominal size, 42 inches wide x 40 inches tall x 42 inches long, chambers. Some big baler designs use air cylinders, but it takes a very large air cylinder to compress the tobacco to densities even approaching that of tobacco compressed by hydraulic cylinders and very large air compressors to supply such cylinders. Increasing density requirements will make it more difficult to use air cylinders.

Hydraulically operated big balers can be powered by a 230-volt electric motor or tractor hydraulic connections. The tractor-powered baler costs less and permits movement to barns and stripping room locations where 230-volt power may not be available. The big balers have optional load cells with an electronic display to show the weight of leaves in the chamber, thus permitting desired bale weights. Big balers can receive non-oriented, tangled leaves, which presents new options and opportunities for mechanically removing and handling leaves from stalks when stripping, as discussed above.

The buying industry initially required big bales in the 500 to 600-pound range, but weight specifications have been increasing since the big balers were introduced in 2005. Depending on the buyer and tobacco grade, some tobacco is now packaged in bales ranging in weight from 700 to 750 pounds. Moisture content specifications have also been decreasing during that same period. Some companies now want moisture levels of 20% or less, which can be very difficult to achieve with heavier bodied grades in years with high humidity at stripping time. The combination of higher tobacco density and lower moisture content specifications in the bale contributes to moisture-content difficulties with big bales. Because of the larger mass of leaves and longer moisture diffusion flow path of the big bale from the inside to the outside, the moisture-content of big bales cannot equalize with the surrounding environment as quickly as small, oriented leaf bales.

At the buying stations, the moisture content of the big bales that are received are assessed with a microwave moisture analyzer instrument known as the "Malcam" (Malcam LTD., Tel Aviv, Israel). These instruments are calibrated to determine an average moisture content value for a bale based on microwave signals transmitted through the bale. The technology allows bale density to be considered. At the farm level, there are moisture probes similar to hay testing probes, but with different calibrations, designed for measuring the moisture content in bales of burley tobacco. Two such probes are the Tobacco Chek moisture meter (Dagmar Enterprises LLC, Leawood, KS) and the Delmhorst F-2000T (Delmhorst Instrument Company, Towaco, NJ). These testers measure moisture in only a small area of the bale near the tip of the probe, so a bale must be tested in at least 3 to 4 locations to determine the average moisture for the bale. The probes seem to work best in well-cured, dry tobacco, but often provide erratic readings in high moisture zones or where fat stems are present. In evaluations conducted by the University of Kentucky with a cooperating grower on approximately 100 big bales, the average of three probe readings per bale were generally like the Malcam moisture content readings obtained for the same bales at the buying station. However, readings for individual bales often differed significantly. Growers should not rely on the moisture content levels determined by probes as a primary means to determine the marketability of bales of tobacco.

Growers have experimented with various ways to remove moisture from big bales with moisture content above acceptable levels. It takes a lot of work to open and flake apart big bales for drying. Trials performed at the University of Kentucky have shown it was possible to get enough air movement through 600-pound bales to reduce the moisture content 1 to 2% over a period of several hours, depending on the ambient conditions. Such drying rates may be far too slow to benefit large stripping operations, however, and even those drying rates may not be a realistic expectation with the increased density of 700+ pound bales.

Stripping Dark Tobacco

A fully mature dark tobacco plant will have 16 to 18 marketable leaves. Dark tobacco (fire-cured and air-cured) has traditionally been sorted into three grades at stripping. These grades include lugs (three to six leaves showing some ground injury from the lower portion of the stalk), seconds (four to six leaves from the middle portion of the stalk), and leaf (four to six leaves from the upper stalk). In addition, separate grades should be kept for "trash" and "green." The trash grade is partial leaves from the bottom of the stalk or whole leaves that show excessive ground injury, and the green grade is leaves from anywhere on the plant that show an excessive green cast appearance or that have dark green areas resulting from sunburn or other weather-related damage in the field. Most marketing contracts will only support lug, second, and leaf grades and will not support trash and green. Recently, major buying companies have begun requiring only two grades (lug and leaf), with the seconds grade split between the lug and leaf grades. Most contracts will require a crop throw of 10 to 25% lug and the remainder leaf. At least one marketing contract even combines the lug and leaf into one grade. Target moisture levels at delivery are generally no more than 25% for dark fire-cured and 22% for dark air-cured. Refer to marketing contracts for specific stripping, grading, and marketing specifications.

Marketing Packages for Dark Tobacco

Baskets

The basic and traditional unit of many dark tobacco marketing packages has been what is known as a "flake." Flaking dark tobacco involves manually compressing leaves during stripping into a small flake box (typical inside dimensions 4 inches wide x 19 inches tall x 26 inches long) that stands vertically so that a 4-inch layer or "flake" of tobacco is formed with the leaf butts aligned. Flakes should generally not be more than 4 inches thick and 20 inches in width. Flaking produces compressed layers of tobacco that can be arranged in alternating directions to build the more traditional basket-type marketing packages. "Baskets" or "heads" are generally wooden lids from hogshead storage containers, and are usually supplied by the buying company. The flakes of tobacco are stacked on them neatly. If space constraints in the stripping area don't allow baskets to be assembled immediately, flaked dark tobacco may be compressed into small bales (typically 18 inches wide x 12 inches tall x 36 - 44 inches long, depending on the length of the tobacco) for storage until basket-type packages can be made later or at another location. Final weight of basket marketing packages is usually targeted at 850 pounds and should not exceed 900 pounds. Basket-type marketing packages have been the most commonly used marketing package for dark tobacco in past years, but newer more efficient marketing packages for dark tobacco have been introduced by some companies in recent years.

Boxes and Large Bales

Some dark tobacco contracts allow delivery in C-48 cardboard boxes supplied by the buying company. Dimensions of C-48 boxes are approximately 28 inches wide x 29 inches tall x 40 inches long. Boxes are assembled, uniformly filled with oriented tobacco, and held together with two cotton strings. Use of these boxes generally eliminates the use of small bales for storage until the tobacco can be basketed and, although the tobacco is still somewhat oriented within the box, does not require flaking. Flaked or oriented non-flaked tobacco can be placed directly into boxes at the time of stripping, allowing considerable timesavings compared to preparing baskets. Target weight for C-48 boxes of tobacco is approximately 250 pounds. Recently, at least one major dark tobacco buyer has allowed dark tobacco (air-cured and fire-cured) to be baled in large, tangled leaf bales like those used for burley. Consolidation of grades and use of large, tangled leaf bales should result in major increases in efficiency during stripping and market preparation of dark tobacco.

Hand-Tied Wrapper Leaf

Dark wrapper leaf is ultra-high-quality dark tobacco that is broad in width, uniform in color, has small secondary veins, and almost no holes or other flaws. Cigar wrapper dark leaf is from the leaf position only and usually makes up no more than 30 to 40% of the total number of the leaves on the stalk. Dark tobacco that is sold as wrapper leaf is still tied in hands and arranged on baskets for delivery. Hands should be neatly tied with 10 to 15 leaves plus one tie leaf. They are usually arranged in a circular pattern on a basket for delivery.

Non-Tobacco Related Materials

The tobacco industry has no tolerance for non-tobacco related materials (NTRM) or other contamination in tobacco marketing packages. NTRM may be more likely in large bales, requiring more prevention and monitoring. Stripping areas must be kept clean, orderly, and free of any NTRM. Woven synthetic tarps that may become frayed can be a source of NTRM contamination and should not be used during handling and storage of stripped tobacco, or for covering tobacco during transport for delivery to the buying station. Trash accumulated from the stripping area, such as drink cups and food wrappers, are a major source of NTRM. Break areas for workers should be separate from areas where tobacco is handled to reduce the chances of NTRM contamination. Tobacco curing, stripping, and storage facilities should also be made bird-proof so that the tobacco does not become contaminated with bird droppings and feathers. Styrofoam has also become a major NTRM problem for the industry, as Styrofoam particles are very difficult to remove from the tobacco during processing. Ensure that Styrofoam does not come in contact with tobacco at any time during curing, stripping, and market preparation. Remember that NTRM is not just synthetic articles such as Styrofoam, plastic, drink cups and food wrappers, but also includes non-marketable plant material such as stalk pieces, suckers, and weeds. Stripping crews should be trained on the importance of NTRM elimination and monitored frequently to ensure that the stripping area and marketing packages are free of NTRM.

References

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