AGR-266

University of Kentucky
College of Agriculture,
Food and Environment
Cooperative Extension Service

Chemical Topping of Burley Tobacco

Mitchell Richmond, Plant Sciences, University of Tennessee ; and Andy Bailey and Bob Pearce, Plant and Soil Sciences, University of Kentucky

Introduction

Burley tobacco growers make management decisions that impact the overall yield, leaf quality, and profitability each growing season. To complicate these decisions, every growing season introduces new challenges (e.g., disease pressure, seasonal weather patterns, labor availability) that can add burdens to the management of the crop. The ultimate goal for burley tobacco producers is to maximize yield and leaf quality while minimizing the cost of production. The University of Tennessee 2021 Burley Tobacco Budget (D 37-A) estimates that the total variable cost in the production of burley tobacco is $3,724.44 per acre with hired labor accounting for $2,265 per acre assuming that the crop can be produced with 150 labor-hours per acre. Therefore, burley growers should find areas within their operations where labor costs can be reduced.

One area with potential for labor reduction that has received recent interest is topping, which is the act of removing the terminal floral portion of the plant. Timely topping shifts the plant's energy from reproductive mode (seed production) to vegetative mode (leaf production) while stimulating root growth and nicotine synthesis in the roots. Timely topping ensures that yield and leaf quality will reach maximum potential prior to harvest. Topping should occur very early in floral development. If topping does not occur until full flower, the plant will have spent more energy to support the development of seed and less energy to leaf production, resulting in yield loss. Studies have shown that chemical topping is an alternative method to manual topping.

Chemical topping utilizes sucker (i.e., axillary bud) control compounds applied prior to the bloom stage when a grower would normally be manually topping. These applications of sucker control compounds also serve as a method for controlling subsequent sucker growth, which occurs after topping. If this practice is used, five labor-hours per acre or more can be eliminated from the overall production cost, as topping and sucker control occur in one mechanized operation.

Variety Selection

Previous research has shown that later maturing varieties like KT210, HB4488, KT215 or NC7 are well suited for chemical topping. However, chemical topping of earlier maturing varieties such as KY 14XL8, KT212 and KT219 may not be as successful due to the more rapid change from vegetative to reproductive growth. More information about variety selection can be found in the 2021-2022 Burley and Dark Tobacco Production Guide (ID-160). This rapid change to reproductive growth makes timing the chemical topping application much more difficult in early maturing varieties. Varieties that are medium to late maturing not only flower later than early maturing varieties, but they also transition to flowering at a slower pace. This ensures a better chance of targeting the application at the optimal stage for successful chemical topping. In previous research, the total yield from chemically topped treatments was comparable to the yield from manually topped treatments in both the medium maturing TN90 and late maturing KT210 (Table 1).

Table 1. Total yield from chemically and manually topped burley tobacco.

	Burley Tobacco Yield (lbs/A)	
Treatment	TN90[c] (Medium Maturity)	KT210[c] (Late Maturity)
Untreated[a]	2050	2232
Manually topped at 10% bloom[b]	2629	2890
Chemically topped at 10% button[b]	2589	2789
Chemically topped at 50% button[b]	2618	2602

[a]Untreated was topped but no sucker control treatment was applied.

[b]Manually topped and chemically topped treatments received Royal MH-30 (1.5 gal/A) plus Butralin (0.5 gal/A).

[c]There was no statistical difference in yield between manually topped TN90 or KT210 and chemically topped TN90 or KT210 at 10% or 50% button.

Application Timing

To eliminate the need for manual topping, chemical topping relies on the appropriate application timing of sucker control compounds. The targeted timing of application is between 10 percent and 50 percent pre-button. Pre-button refers to the stage when only the top of the flower head is visible between the leaf sheath of the bud (Figure 1). At least 10 percent but no more than 50 percent of the plants in the field should be at this stage for an effective chemical topping application. This typically occurs about seven to 10 days prior to when manual topping would normally occur at 10 percent to 25 percent bloom. Blooms present in the field at the time of application will remain in the field at the time of harvest. Therefore, it may be of interest to "clean up" the field by manually removing those blooms before harvest to avoid overlap in the barn. Since chemical topping applications will occur about a week to 10 days prior to when manual topping would have occurred, the tobacco plants will need to stand in the field for about seven to 10 days longer after chemical topping than they would after manual topping.

Figure 1. Burley tobacco bud development is stopped before flowers emerge when maleic hydrazide (MH) is applied at or before the pre-button stage of growth. At least 10 percent but no more than 50 percent of the plants in the field should be at this stage for an effective chemical topping application.

Sucker Control Products and Rates

Maleic hydrazide (MH) is critical for successful chemical topping applications. A single application of MH (2.25 to 3.00 lbs ai/A, 1.5 to 2.0 gal/acre of a regular-concentrate MH formulation, or 1.0 to 1.5 gal/A of a high-concentrate MH formulation) tank-mixed with a local systemic such as butralin (Butralin SC) or flumetralin (Drexalin Plus, Flupro, or Prime+) at 0.5 gal/A should be used. In previous research, there was no benefit to using 2 gal/A of a regular concentrate MH over 1.5 gal/A MH in terms of effectiveness of chemical topping or subsequent sucker control. However, a tank-mixed combination of MH and a local systemic is necessary to maintain acceptable sucker control through harvest, which is an extra seven to 10 days because chemically topped tobacco is sprayed earlier than when manual topping would occur. When MH was used alone, more sucker regrowth was observed at the end of the season. In addition to using the reduced rate of MH, chemical topping may decrease MH residues due to the increased length of time between application and harvest. MH residues were often less in chemically topped tobacco compared to manually topped tobacco except for one location: Lexington, Kentucky, where in 2017 a rainfall event that occurred a few hours after the application likely reduced MH residues (Table 2).

Table 2. Maleic hydrazide residues as affected by manual or chemical topping and precipitation.

	2015[a]		2016		2017	
	Murray	Lexington	Princeton	Lexington	Princeton	Lexington
Treatment			ppm			
GS[b]	64	49 a	15 a	62	41 a	29
Full Mix	33	32 ab	10 b	54	10 b	50
Reduced Mix	59	19 b	11 b	51	36 a	44
P-value	0.1886	0.0944	0.0233	0.7038	0.0231	0.1168
Precipitation[c]			inches			
Manual topping to harvest	1.15	2.43	4.09	1.76	1.23	2.95
Chemical to manual topping	0.07	0.47	0.30	1.35	0.41	1.11

[a]Means within a column followed by the same uppercase or lowercase letter are not significantly different according to Fisher's Protected LSD at P = 0.10.
[b]GS = manually topped followed by MH (2.0-gal acre-1) and butralin (0.5 gal acre-1); Full mix = chemically topped with MH (2.0 gal acre-1) and butralin (0.5 gal acre-1); Reduced mix = chemically topped with MH (1.5 gal acre-1) and butralin (0.5 gal acre-1).
[c]Total rainfall (inches) between topping through harvest or between chemical topping and manual topping treatments.

Conclusion

Chemical topping to target the 10 percent to 50 percent pre-button stage using a tank-mixed application of MH and a local-systemic product provides an alternative to manual topping without negatively affecting yield, leaf quality or chemistry of burley tobacco. Overall, an estimated five or more labor-hours per acre can be saved with chemical topping compared to manual topping in burley tobacco.

Special Considerations

1. Only use later maturing varieties for chemical topping. This allows more flexibility with timing the chemical topping application.
2. Scout your fields before topping to ensure that the 10 percent to 50 percent pre-button timing is targeted for the majority of plants in the field. Later applications will result in blooms in the field at harvest that will require manual removal before tobacco is housed.
3. Apply a tank mixture of MH and a local systemic to ensure that sucker control is effective. A reduced rate of MH (1.5 gal/A regular-concentrate MH or 1.0 gal/A high-concentrate MH) is recommended since research indicates that there were no differences between the full and reduced MH rate in yield, sucker control effectiveness, and potential to reduce MH residues.

Disclaimer: Mentioning of certain products and omission of others does not constitute a recommendation or endorsement. Always consult the current pesticide label prior to applying products.

Issued 06-2022