

Final 2014-2015 Research Project Report

2014-2015 Research Project Evaluation of Chemical Topping in Burley Tobacco

Submitted to Council for Burley Tobacco
by Murray State University
in coordination with
the University of Kentucky

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Table 1. Treatment list for evaluation of chemical topping in burley tobacco.

Treatment #	Bloom Stage at MH + Butralin application	Manual Topping^a
1	Early Button/PreBud (top of bud visible but not elongated)	No
2	Elongated Bud Stage (Bud elongated but few open flowers)	No
3	10% Bloom (approx. 10% of plants in plot have at least one open flower)	No
4	10% Bloom (approx. 10% of plants in plot have at least one open flower)	Yes

^aEach treatment will receive MH (1.5 gal/A Royal MH-30) plus Butralin (0.5 gal/A) at the bloom stage shown. Applications will be made as standard broadcast applications with course nozzles at 50 gal/A spray volume. Treatments 1-3 will receive no manual topping following application while treatment 4 will be topped manually after application as is the standard practice.

The following is the timeline of practices that occurred for this research project in 2014:

April 10, 2014	‘KY14xL8’ and ‘KT 206’ burley tobacco sown in float beds.
June 19, 2014	Burley tobacco transplanted into field
August 11, 2014	All treatments applied to KY14xL8
August 12, 2014	Early button (pre-bud) application made to KT206
August 19, 2014	Elongated bud applications made to KT206
August 27, 2014	10% bloom applications made to KT206
September 23, 2014	All KY14xL8 and KT206 plots harvested and housed for curing

In 2014 we found that KY14xL8, in addition to being an early maturing variety, not only flowers early but also progresses through the bloom stages of flowering very quickly. On Thursday, August 7, it appeared that KY 14xL8 was not quite ready for the first early button application. Rain occurred on August 8 and 9 and by Monday, August 11, nearly all of the KY14xL8 was at least 10% flower. We elected to go ahead and apply the MH + Butralin treatment to all KY14xL8 plots at that time. Although we were not able to recover the timing for most plots of KY 14xL8, we were able to salvage three replications of two of the four treatments in KY 14xL8. The two treatments we were able to recover were the early button/prebud treatment (treatment 1) and the standard manual topping at 10% bloom (treatment 4). Early button applications were made to KT206 the following day. Progression through bloom stages was much slower in KT206 than in KY14xL8, with applications occurring approximately 7 days apart.

Although all applications were made to KY14xL8 on the same day, the MH+Butralin application was successful in stopping terminal growth in all plots of KY14xL8 and at all bloom stages of KT206. For plots manually topped just after application (treatment #4), our average time required for manually topped plots at 10% bloom was 72 seconds per plot, which would be approximately 2 man-hours per acre.

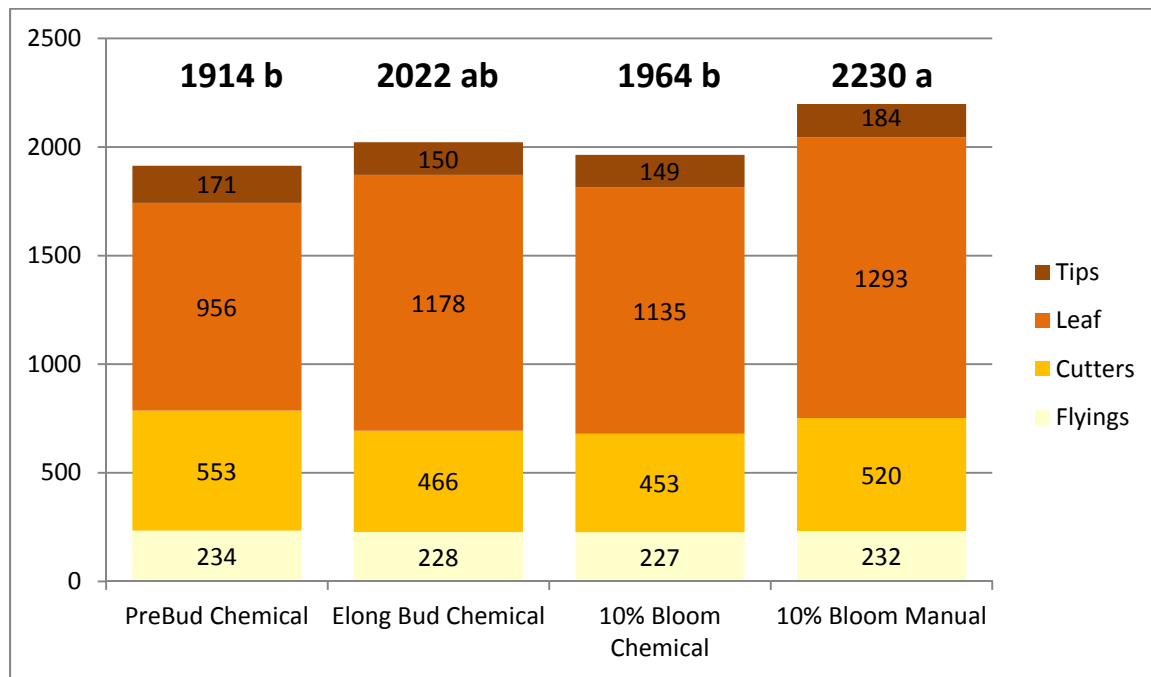
Although MH+Butralin stopped terminal growth (and resulted in excellent sucker control) at all timings, just prior to harvest we elected to manually top tobacco from later applications made at 10% bloom (all of KY14xL8) and even some KT206 plots treated at the elongated bud stage as plants were a few inches too tall for normal handling and housing in our curing structure and it seemed that removal of the dead inflorescence was warranted. Manually topping at this stage took longer and required clippers due to the hardness of the stalks, averaging 87 seconds per plot or approximately 2.5 man-hours per acre. KT206 plants treated at the early button stage showed very little dead inflorescence and so these plants were not manually topped prior to harvest.

Preliminary results suggest that a later maturing variety such as KT206 may have more potential and suitability for chemical topping. It also appears that the most appropriate bloom stage to attempt chemical topping with KT206 is at the early button/prebud stage where manual topping appears to be totally eliminated.

2014 Yield and Quality Data:

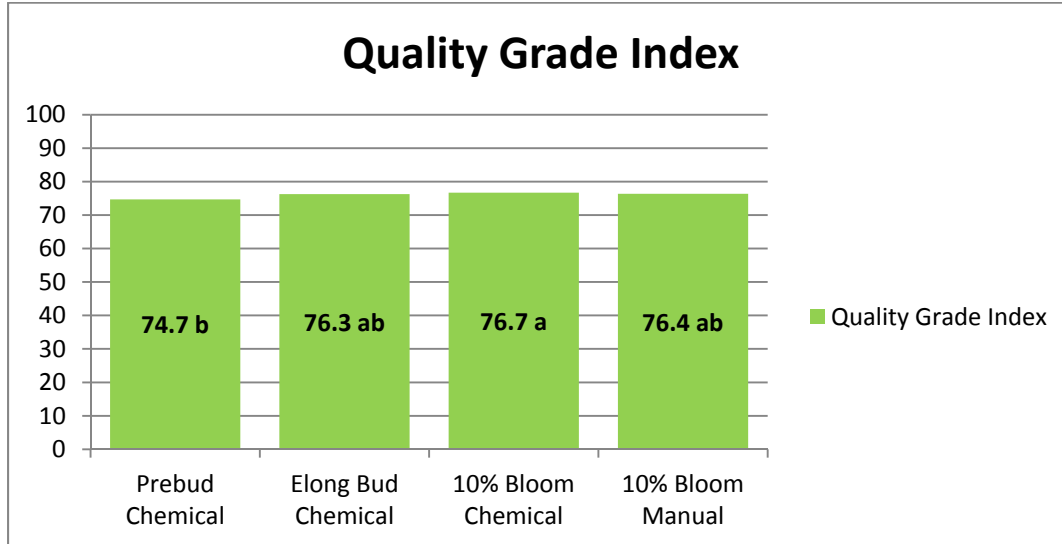
Although in-season field data suggested that the early button/prebud application timing was the best timing to stop terminal growth of the plant, yield data suggested that lowest yields occurred from MH+Butralin application at this timing. KT 206 total yields were lowest where MH+Butralin was applied at the prebud stage (1914 lbs/A), and highest with the standard manual topping at 10% bloom with MH+Butralin application (2230 lbs/A) (*Figure 1*). Although there were some minor differences in quality grade index data for KT 206, quality grade index differences were not major. Lowest quality grade index was seen from plots chemically topped at the early button/prebud stage and was highest in plots chemically topped at 10% bloom (*Figure 2*).

Figure 1. Yield (lbs/A) response of KT 206 to Chemical Topping Practices in 2014.



*Total yield per acre shown at the top of each column. Yields followed by the same letter are not different according to Fisher's protected LSD at p=0.10.

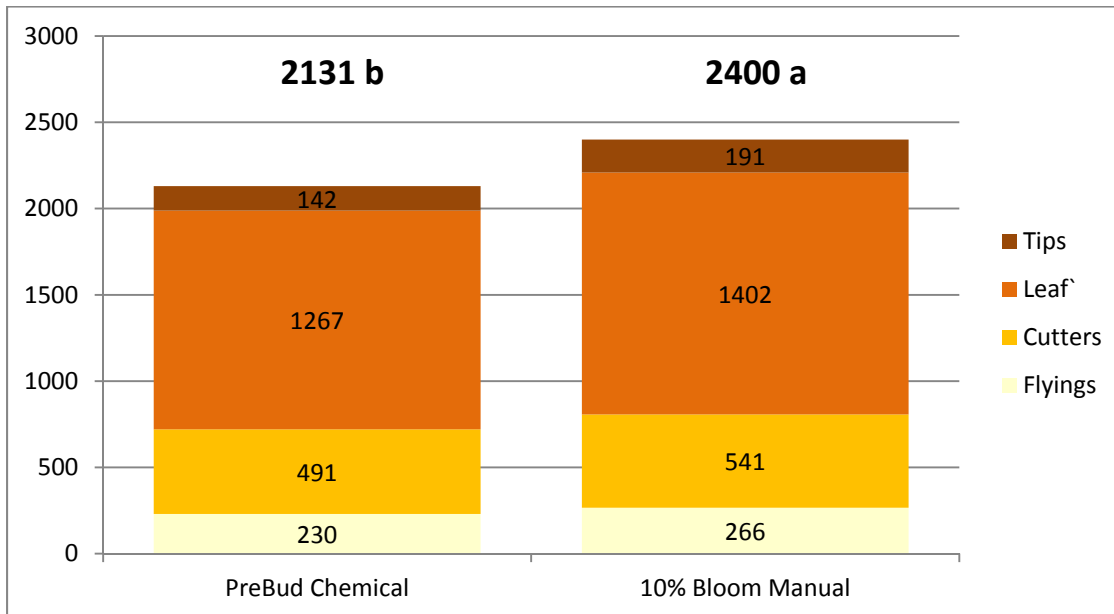
Figure 2. Quality grade index (0-100) results from chemical topping treatments to KT 206 in 2014.



*Values followed by the same letter are not different according to Fisher's protected LSD at p=0.10.

For the two treatments that were recovered from KY 14xL8, total yield (lbs/A) differences between plots chemically topped at the early button/prebud stage and plots manually topped at 10% bloom were similar to differences seen between these same treatments in KT 206 (Figure 3). Total yield in plots chemically topped at the prebud stage was 2131 lbs/A compared to 2400 lbs/A in plots manually topped at 10% bloom.

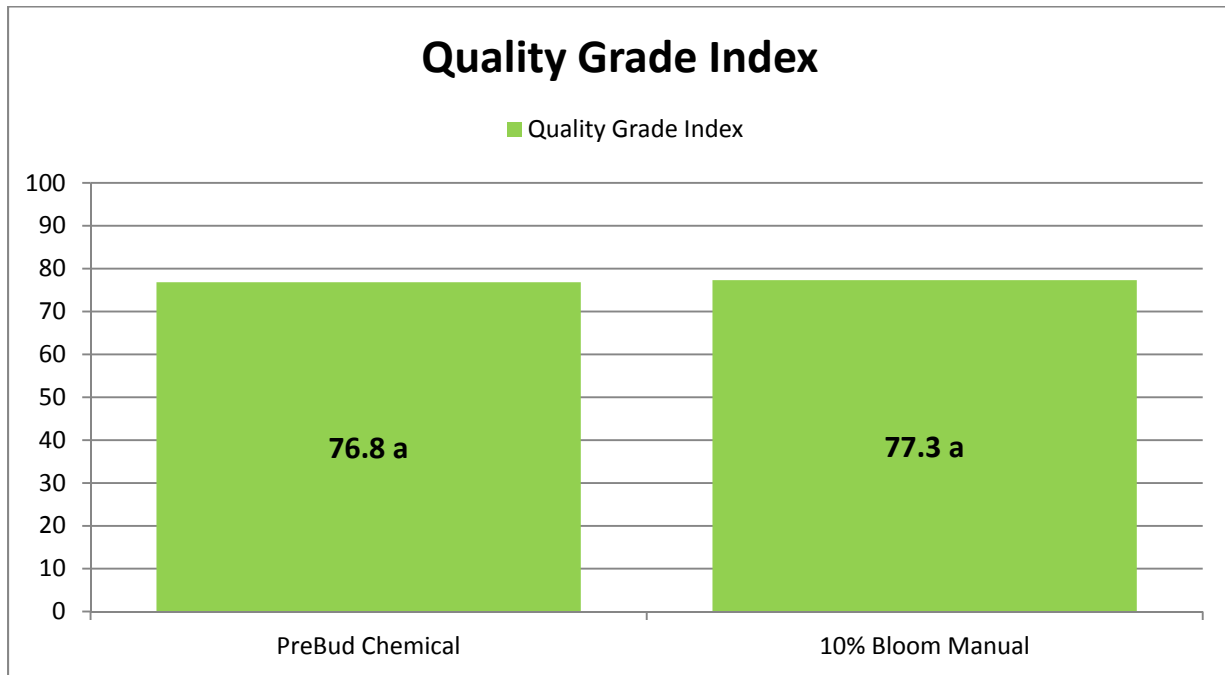
Figure 3. Yield response (lbs/A) of KY 14xL8 to chemical topping practices in 2014.



*Total yield per acre shown at the top of each column. Yields followed by the same letter are not different according to Fisher's protected LSD at p=0.10.

Differences seen in quality grade index data for KT 206 were not apparent in the two treatments in KY 14xL8, as grade index was similar for plots chemically topped at the prebud stage or manually topped at 10% bloom (*Figure 4*).

Figure 4. Quality Grade Index (0-100) results of chemical topping treatments to KY 14xL8 in 2014. Differences between treatments were not significant.



*Values followed by the same letter are not different according to Fisher's protected LSD at p=0.10.

This experiment will be repeated in 2015. We plan to make special accommodations for the KY 14xL8 variety in order to be able to make all of the applications at the appropriate timings.

Final budget report for 2014 research project expenditures given below:

Expenditure	Cost
Crop maintenance (transplant production, land preparation, fertilizer, transplanting, pest control, harvest)	\$500 per treatment x 4 treatments x 2 varieties = \$4,000
Supplies (float trays, plot stakes, harvest tags, treatment application costs (nozzle tips, chemical, fuel and maintenance for sprayer)	\$1,000

Final 2015 Report:

The second field season of this project to evaluate chemical topping of burley tobacco is now complete. The following is the timeline of practices that occurred for this research project in 2015:

April 3, 2015	'KY14xL8' and 'KT 206' burley tobacco sown in greenhouse float beds.
June 17, 2015	Burley tobacco transplanted into field
August 3, 2015	Early button (pre-bud) application made to KY14xL8
August 7, 2015	Elongated bud application made to KY14xL8
August 10, 2015	10% bloom applications made to KY14xL8
August 10, 2015	Early button (pre-bud) application made to KT 206
August 13, 2015	Elongated bud application made to KT 206
August 18, 2015	10% bloom applications made to KT 206
October 2, 2015	All KY14xL8 and KT206 plots harvested and housed for curing
November 28, 2015	All KY14xL8 and KT206 plots taken down to be stripped

In 2014 we found that KY14xL8, in addition to being an early maturing variety, not only flowers early but also progresses through the bloom stages of flowering very quickly. Consequently, we were only able to make the final 10% bloom applications to KY14xL8 in 2014. In 2015, we made extra efforts to make sure we got all of the KY14xL8 applications made at the specified timings.

For plots manually topped just after application (treatment #4), our average time required for manually topped plots at 10% bloom was 114 seconds per plot, which would be approximately 2.6 man-hours per acre.

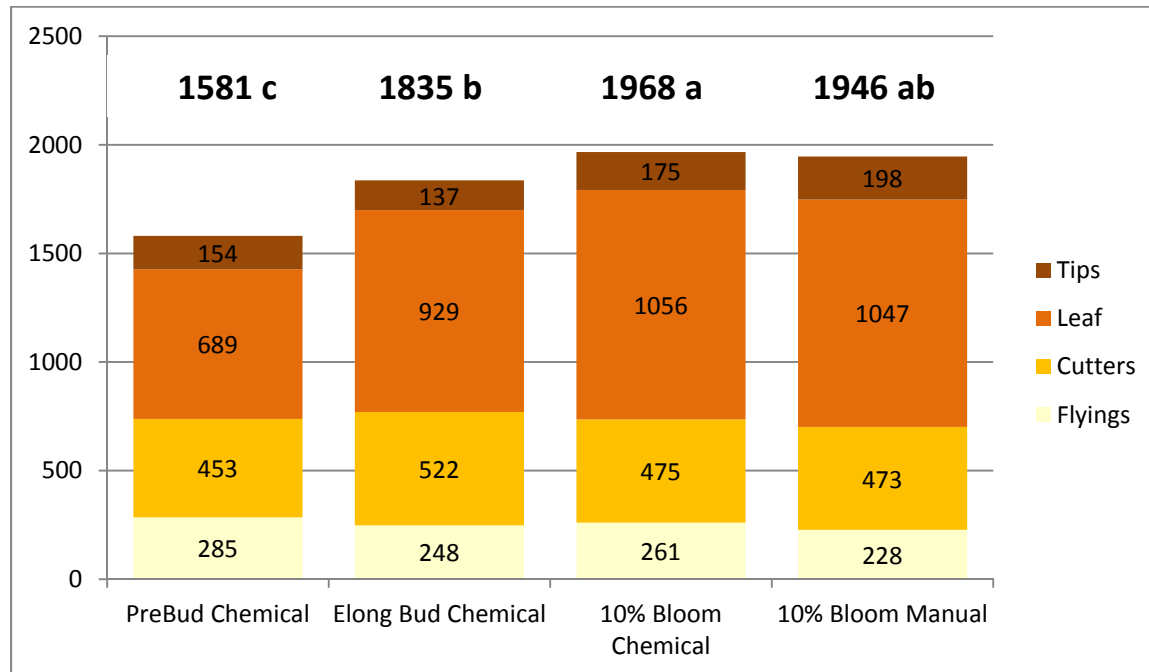
MH + Butralin stopped terminal growth (and resulted in excellent sucker control) at all timings. As in the first year of this project in 2014, just prior to harvest we elected to manually top tobacco from later chemical topping applications made at 10% bloom on both varieties, as plants were a few inches too tall for normal handling and housing in our curing structure and it seemed that removal of the dead inflorescence was warranted. Manually topping at this stage took longer and required clippers due to the hardness of the stalks, averaging 137 seconds per plot or approximately 3.1 man-hours per acre. Plants treated at the early button (pre-bud) stage showed very little dead inflorescence and so these plants were not manually topped prior to harvest.

2015 Yield and Quality Data:

There was a significant yield response to chemical topping treatments in KY 14xL8 in 2015 (Figure 5). Lowest total yield was with chemical topping applications of MH+Butralin at the prebud stage (1581 lb/A), and highest with chemically topped or manually topped tobacco at the

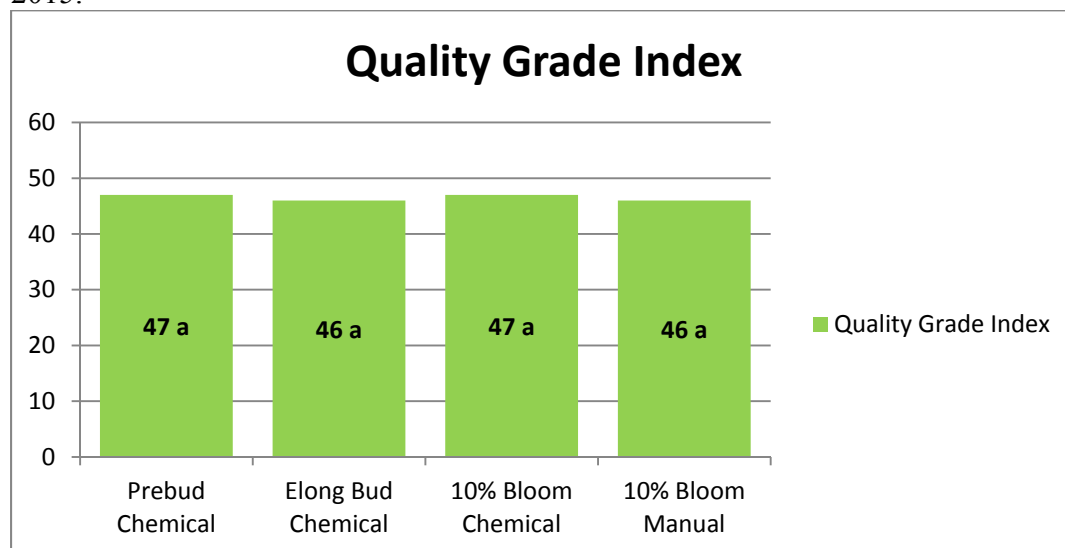
10% bloom stage (1946 to 1968 lb/A). The 2015 curing season was considerably drier than in 2014 curing season and resulted in considerably lower quality grade index values in 2015. Quality grade index ranged from 46 to 47 and was not different between treatments (Figure 6).

Figure 5. Yield response of KY 14 x L8 to chemical topping practices in 2015.



*Total yield per acre shown at the top of each column. Yields followed by the same letter are not different according to Fisher's protected LSD at $p=0.10$.

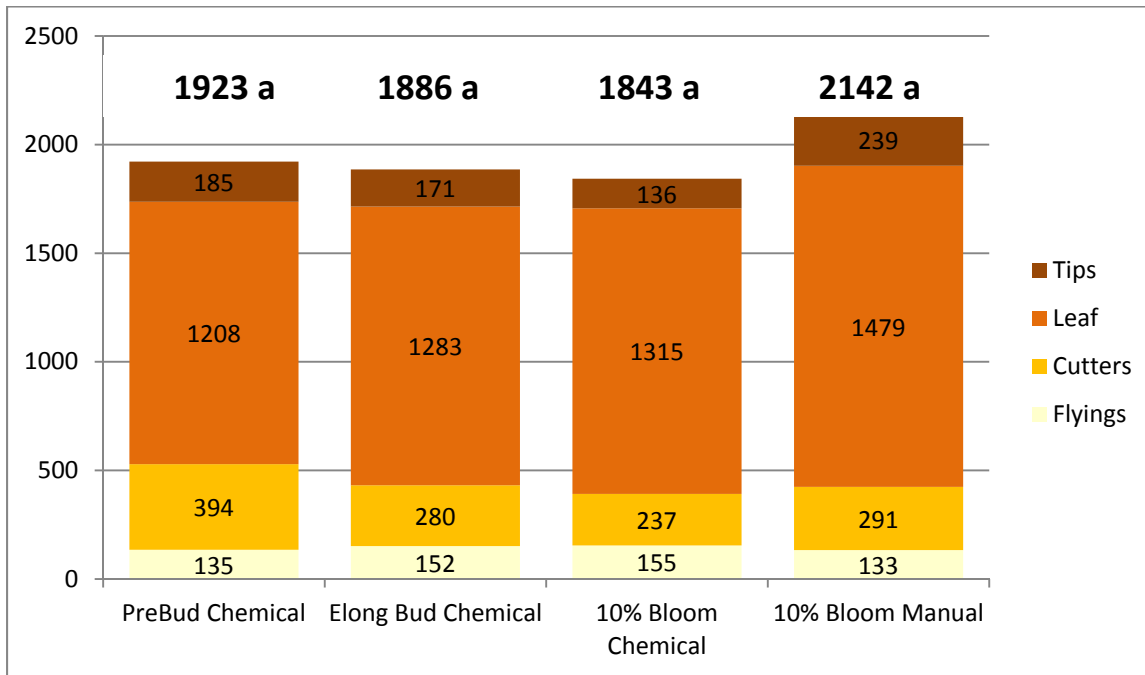
Figure 6. Quality grade index (0-100) results from chemical topping treatments to KY 14xL8 in 2015.



*Values followed by the same letter are not different according to Fisher's protected LSD at $p=0.10$.

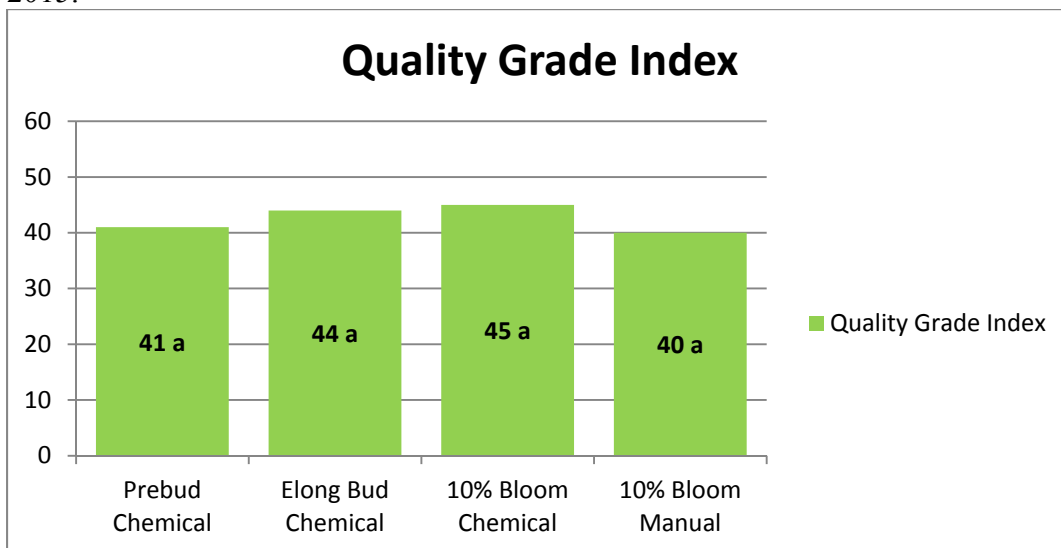
There was a lesser yield response to chemical topping treatments in KT206 than in KY 14xL8 in 2015. Although there were no significant differences in total yield between treatment in KT206, total yield was at least 219 lbs/A higher where standard manual topping practices were used instead of chemical topping practices. Similar to KY14xL8 quality data, grade index values were lower in 2015 compared to 2014, presumably due to the drier 2015 curing season.

Figure 7. Yield response of KT206 to chemical topping practices in 2015.



*Total yield per acre shown at the top of each column. Yields followed by the same letter are not different according to Fisher's protected LSD at $p=0.10$.

Figure 8. Quality grade index (0-100) results from chemical topping treatments to KT206 in 2015.



*Values followed by the same letter are not different according to Fisher's protected LSD at $p=0.10$.

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Supplies (float trays, plot stakes, harvest tags, treatment application costs (nozzle tips, chemical, fuel and maintenance for sprayer)	\$1,000

Final 2014-2015 Project Conclusions:

Sucker control from all treatments was very good (97% or higher) with either variety in either year, and all treatments appeared to stop terminal growth of the plant, regardless of bloom stage at application. However, as previously described, later chemical topping applications made at 10% bloom, and some plants in elongated bud applications resulted in a dead inflorescence that may have added 6 to 10 inches to the length of the plants. Therefore, we elected to manually clip these tops out prior to harvest in order to facilitate easier handling and housing of the tobacco.

These results indicated that later maturing burley varieties may be more conducive to chemical topping systems. Early maturing varieties like KY 14xL8 not only bloom early but also progress through bloom stages faster than later maturing varieties, allowing for a smaller window of time to make chemical topping applications at precise bloom stages, as was evident in 2014. However, when applications were made at the precise bloom stages in 2015, KY 14xL8 appeared to be more responsive in yield than KT206. Overall, KT206 appeared to be a better variety for chemical topping systems. Other data suggest that varieties that are even later than KT206, such as KT210 or NC7, may fit the best into chemical topping programs. There were some minor differences in yield of individual stalk positions based on treatment, such as higher flyings in KY14xL8 with prebud treatments and higher cutters with prebud treatments in KT206. Surprisingly, we found no differences in quality grade index between chemical topping treatments and standard manual topping treatments.

Our best estimates of time required for topping at the normal 10% bloom stage was almost 2 man-hours per acre (1.97 man-hours). However, more experienced laborers may be able to top an acre of tobacco in 1.5 man-hours or less. At current 2016 labor rates, 2 man-hours per acre would cost less than \$22 per acre. Average differences in total yield between early chemical topping treatments (prebud and elongated bloom) and the standard manual topping treatment was about 200 lbs/A (214 lbs/A in KT206 and 190 lbs/A in KY14xL8). Differences of

200 lbs/A would equate to differences in returns of \$375 per acre or more based on current market prices for burley tobacco. Due to these economic differences between costs of topping and yield reductions associated with chemical topping, these results indicate that burley tobacco growers should continue to use manual topping practices at the 10% bloom stage with MH+Butralin application.