

Interim Report to
Council for Burley Tobacco

2015 Grant Funding for
Topping Height of High Leaf Potential Hybrids

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Rationale

The newer burley hybrids released by the Kentucky-Tennessee Tobacco Improvement Initiative (KTII), KT 206LC, KT 209LC and KT 210LC, are considered to be “late maturing” because flower buds develop about 10 days later than the older varieties (KY 14, K14 x L8) and have a higher leaf number potential (HLP), producing six to ten more leaves than the older, lower leaf number potential (LLP) ones. The Kentucky-Tennessee Burley Production Guide recommends that topping should be done when 10 to 25% of the plants are in flower, leaving 22 to 24 leaves on the plant.

As a consequence of this guideline, there are two possible outcomes for these newer HLP varieties if they are topped when the recommended number of plants are in flower: either as many as 6-10 leaves are removed to reduce the leaf number down to the 22-24, or, if only the flower is removed, up to 30 leaves will remain on each plant. In the first situation, the potential yield will be reduced because a considerable number of fully expanded leaves would be removed, and in the second, the longer stalks are more difficult to handle during loading and hanging, increasing the risk of houseburn of the overlapping tails in the barn, and the cost of stripping the leaves will also be greater. In both situations, harvesting would be delayed by 7–14 days, and therefore the temperature during curing will be cooler and less conducive to a good cure. The average high temperature drops from 82 to 73°F from September 1 through to September 30, and the average low from 62 to 53°F.

A third possibility may afford the grower several advantages over the current practices: top these HLP hybrids earlier, when leaves 22 to 24 are six to eight inches long. These advantages include reduced stripping costs, easier handling from topping to barn loading, improved sucker control, and less prone to lodging.

These high leaf potential hybrids can “hang on longer” in the field before they need to be harvested. This may suggest that they are slower to ripen in which case harvest may have to be delayed for longer than the conventional 28 days after topping.

The most economically advantageous aspect of topping these hybrids early is that there is the potential for chemical topping which would considerably reduce the cost of labor.

The first test with the objective of rationalizing the topping height of these new varieties was done in 2013. The details of the treatments were modified in each of the two succeeding seasons based on the previous year’s results. This previous work demonstrated that the new HLP varieties (KT 206, KT 209 and KT 210) yield as well as the LLP varieties (KY14 x L8 and KT 212) when these are topped at the same time and to the same number of leaves, but have the potential for an additional 10 – 15% yield if they are topped when 10 – 25% of the plants are in flower. If these HLP varieties are only topped at this late stage, the plants are 16 to 20 inches taller than the LLP varieties, and therefore very awkward to handle through to stripping, and have an additional six to eight leaves.

The 2015 experiment aims at refining the height at which high leaf number potential varieties can be topped without sacrificing any yield but with the benefit of having shorter stalks to handle and fewer leaves to strip.

Treatments and Methods

The crop was grown using standard agronomic practices for central Kentucky, including 200 lb. nitrogen/acre as 46% urea, and routine weed, insect and disease control measures.

In the 2015 test, KT 212 was again used as the criteria for topping KT 210 early (Table 1), and an attempt was made to top the two varieties to the same number of leaves. This was done by first topping the KT 212 when 10 – 25% of the plants were starting to flower (Fig. 1A) in such a way that the flag leaf plus one or two more leaves were removed, or so that the topmost remaining leaf was 6 – 8 inches long (Fig. 1B). The early topped KT 210 treatments were then topped to as near to this number as possible by counting the leaves on every third plant and topping so that the topmost remaining leaf was also 6 – 12 inches long. The intermediate topping five days later was done by removing leaves such that, again, the topmost leaf was six to twelve inches long. The standard topping of the KT 210 was done by removing the flower plus one or two leaves below the flag leaf. The suckers were controlled by weekly applications of fatty alcohol that were poured over the top of the cut stalk because application of dinitroaniline and maleic hydrazide to individual plots at different times was extremely difficult. The various variety/topping stage combinations were harvested after either 28, 33 or 38 days after topping (Table 1).

The number of leaves per plant was calculated by counting the number of leaf nodes on a sample of 10 plant stalks per plot after stripping, and the length of the stalk of these same plants was measured. The weight of each grade was recorded.

Results

Growth of the crop was poor during the early part of the season because of the very wet weather through to the end of July, after which it was very dry. The treatments were topped on July 31, August 5 and August 10, and harvested on August 27, September 2 and September 8 (Table 1). The test was stripped in late January.

The KT 212 had 18 to 20 leaves remaining on the plants when this variety was topped at 10 – 25% flower on July 31 (Fig. 2), and there was an average of 20 leaves on the KT 210 when it was topped early, at the same time as the KT 212. When the KT 210 was topped five days later (August 5), there were 23 – 24 leaves per plant, and 27 leaves when the KT 210 was topped at 10-25% flowering on August 10.

The average stalk height of KT 212 was 41 to 42 inches (Fig. 3). The early topped KT 210 was a few inches shorter than the KT 212. As the topping was delayed, so the plant height increased and was 60 inches when it was topped as it was starting to flower (Fig.4).

The only significant difference in yield was between the early topped KT 210 that was cut 28 days after topping (2446 lb./acre) and the intermediately topped KT 210 that was cut after 33 days after topping (2808 lb./acre) (Fig. 5). There is however a very strong trend that the later the crop is topped, and the longer it remains before cutting, the higher the yield. There was however, a considerable difference in the yield of the tip grade between the KT 210 topped at 10-15% flower (249 lb./acre) and all the other treatments (Fig. 6). Conversely, the yield of the primings increased as topping and cutting was delayed (Fig. 7). There were no real differences in the yield of the lugs and leaf grades.

Discussion

The yield of each topping/harvest combination is affected by two primary interacting factors: the number of leaves on the plant after topping and the time that each treatment is actively growing and gaining weight before cutting, whether this time is from setting to topping, or topping to harvest, or a combination of the these two (Table 1). The recently released variety KT 212 was developed by KTTII to satisfy the need by growers for an “early maturing” variety similar to the previously very successful and easily managed variety KY14xL8. Both are short plants because they have a leaf number potential of only about 20 leaves per plant. It seems that the yields from these varieties

are considered acceptable to the growers. The newer “late maturing” varieties have a leaf number potential of up to as many as 30 leaves, but flower buds only start appearing about 10 days later than the shorter LLP varieties. These two plant types produce leaves at about the same rate, so topping these at the same time, and to the same topmost leaf size (the “KT 212 standard 28d” and “KT 210 early 28d” treatments), will leave about the same number of harvestable leaves on each. The data in this test shows that if these two plant types are then harvested at the same time, the yields are similar, regardless of whether they were cut 28 or 38 days after topping (Fig. 5).

Although the time between topping and harvesting is affected by the availability of labor and weather constraints, harvesting 28 days after topping generally ensures the optimum tradeoff between the increase in yield with time after topping and fall off of quality if it is harvested later. In this test, the yields of both the LLP variety KT 212 and the HLP variety KT 210 increase if the interval between topping and cutting is increased from 28 days to either 33 or 38 days, regardless of when each was topped (Fig. 5). However, there is no noticeable increase in yield between the KT 210 topped at the intermediate time and that topped a few days later, and may the intermediate topped treatment harvested 33 days after topping may even yield slightly more than the standard topping cut after 28 days.

As was expected, the standard topping of the KT 210 produces significantly more tip grade than the other treatments. This may be a consideration for growers depending on contractual agreement with the purchaser. To gain the full advantage of topping these HLP varieties it is imperative that the topping be done when the topmost leaf after topping is still no more than six to inches. Considerable loss of potential yield will occur if the upper leaves are allowed to expand and only then are they removed to reduce stalk height and leaf number down to a manageable level.

It should be noted that this discussion is based on the data from one experiment. Seasonal differences could have a large effect on the differences between the treatments and this test was therefore repeated in 2016 (data not yet available) and should be done for a third year to confirm the conclusion from the first two years. This series of test dovetails with the work being done on chemical topping and illustrates that it several young leaves could be sacrificed to the expediency of topping with suckercides.

Conclusion

The unmanageable plant height of the new blackshank-resistant varieties can be moderated by topping early, when there are about 20 leaves on the plant longer than six inches, and yields the same as the newer LLP variety KT 212. This may satisfy some growers, but this yield would fall short of the full potential of these HLP varieties by as much as 300 lb./acre, or about 10%. A portion of the reduced gross return on this lower yield may be recuperated by the slightly reduced labor cost of stripping fewer leaves. The primary benefit however may well be the ability of the labor to cut, load and house a crop that is up to 18 inches shorter than the tall HLP varieties when topped only when they start flowering.

Tables and Figures:

Table 1. Variety, topping and harvest date combinations, dates and seasonal length

						<u>Set</u>	<u>Top</u>	<u>Cut</u>
<u>KT 212</u>	<u>Standard</u>	<u>28 days</u>	<u>7-Jun</u>	<u>31-Jul</u>	<u>27-Aug</u>	<u>54</u>	<u>27</u>	<u>81</u>
KT 212	Standard	38 days	7-Jun	31-Jul	8-Sep	54	39	93
KT 210	Early	28 days	7-Jun	31-Jul	27-Aug	54	27	81
KT 210	Early	33 days	7-Jun	31-Jul	2-Sep	54	33	87
KT 210	Early	38 days	7-Jun	31-Jul	8-Sep	54	39	93
KT 210	Interm	28 days	7-Jun	5-Aug	2-Sep	59	28	87
KT 210	Interm	33 days	7-Jun	5-Aug	8-Sep	59	34	93
KT 210	Standard	28 days	7-Jun	10-Aug	8-Sep	64	29	93



A.



B.

Fig. 1. A. Standard topping is done when 10 – 25% of the plants are starting to flower. B. the uppermost leaf on the plant after topping is six to eight inches long.

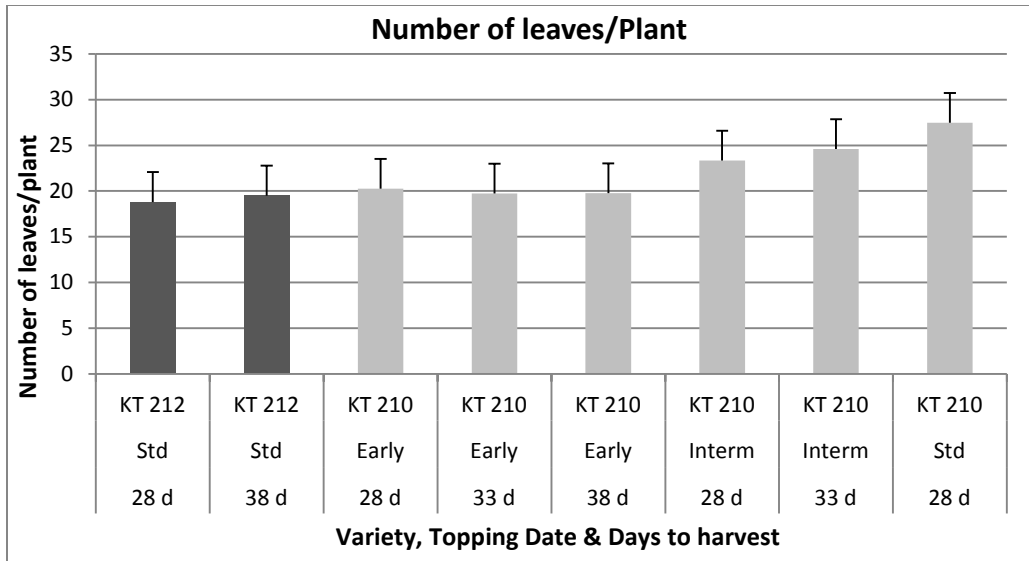


Fig. 2. The average number of leaves per plant after topping for each variety/topping stage/harvest date combination.

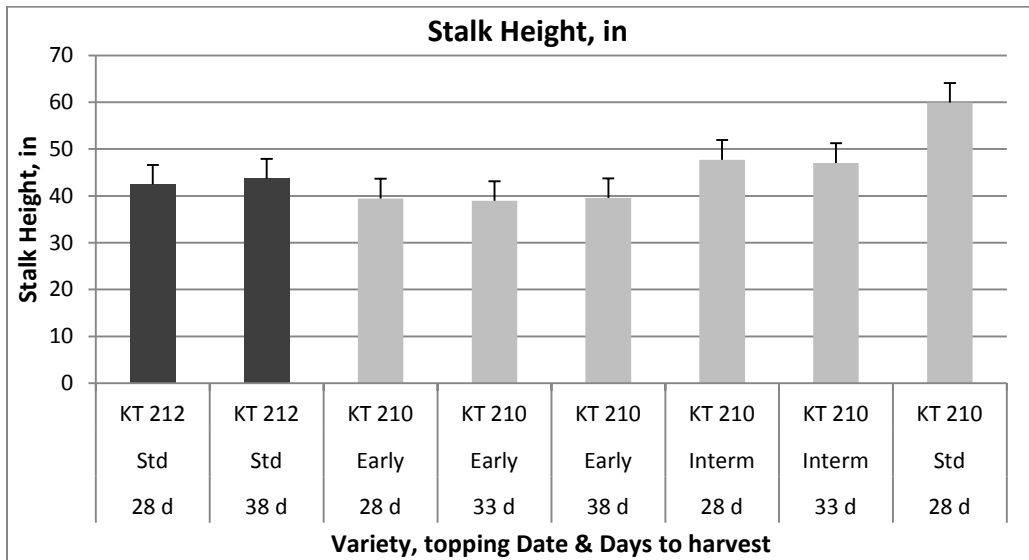


Fig. 3. The average stalk height after topping for each variety/topping stage/harvest date combination.



Fig. 4. KT212 (left) at 25% flower was topped 10 days before KT 210 (right) at 25% flower. The difference in stalk height is 18 inches.

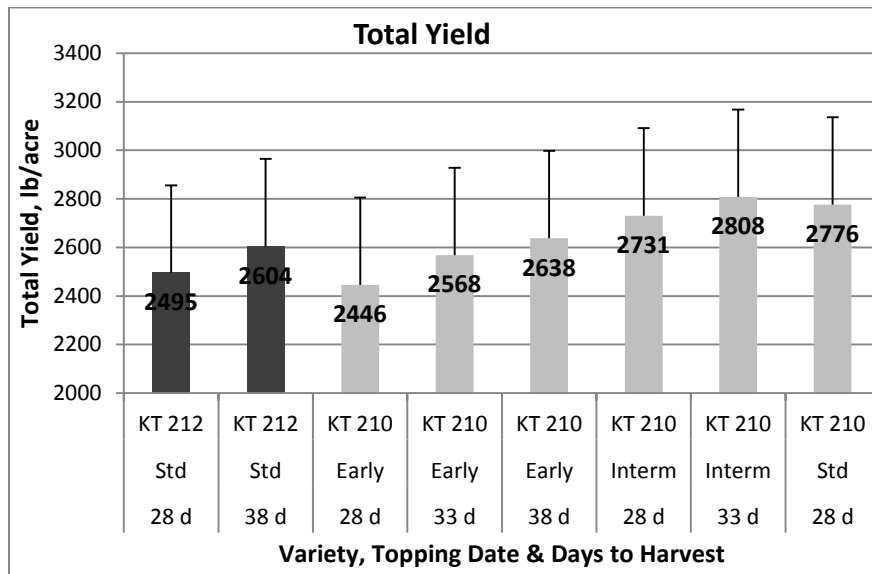


Fig. 5. The average yield of each variety/topping/harvest date treatment.

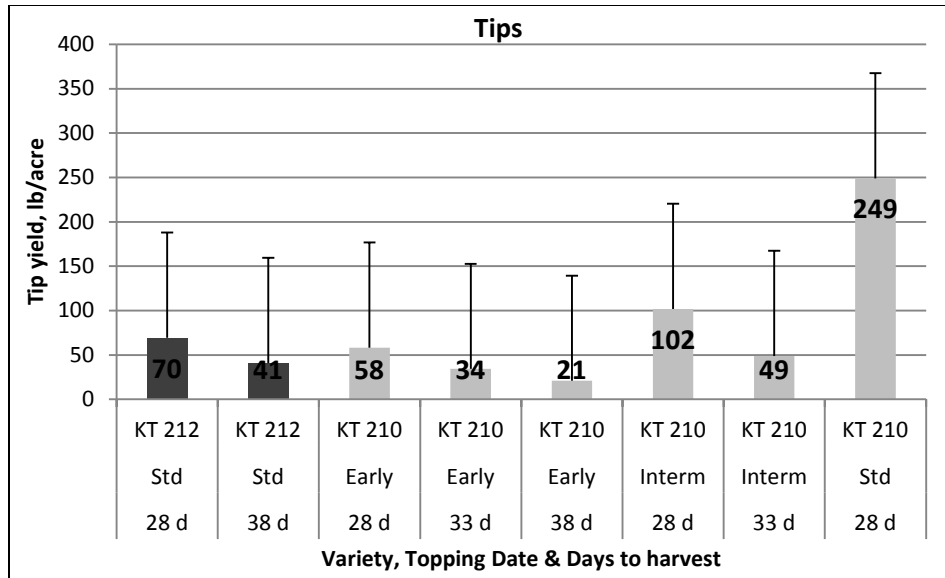


Fig. 6. The average yield of tip grade of each variety/topping/harvest treatment.

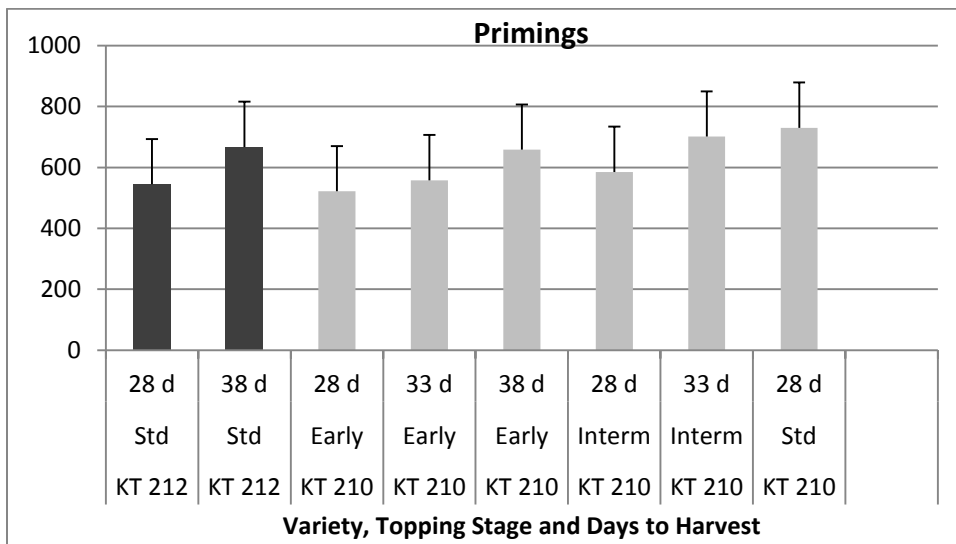


Fig. 5. The average yield of primings of each variety/topping/harvest treatment.