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FACTORS AFFECTING COLOR OF CURED BURLEY LEAF

J.L. Sims, G.K. Palmer and K.L. Wells

Much interest has been shown by tobacco growers during recent months in fertilization and other management practices that can be used to produce darker and redder cured leaf of burley tobacco. The purpose of this newsletter is to summarize what we know about some of the factors which affect color of cured leaf.

Curing Season Characteristics

It is our opinion that the nature of the curing season exerts the most influence on color of cured leaf. Weather patterns that are dry and cool during curing, will result in more variegated or light colored cured leaf. Also, if the curing season is dry, there will be more green coloration. In

contrast, when the curing season is warm and moist, colors are likely to be dark and somewhat more uniform. Although weather patterns are beyond one's control, curing conditions inside the barn can be improved by managing airflow with the use of ventilators and fans to move air through the tobacco during high humidity periods, and to restrict airflow during very dry periods. Supplemental heat can be used to lower humidity levels, improve curing, and prevent houseburn during extremely humid periods.

Nitrogen Content of the Leaf

In general, tobacco containing high concentrations of nitrogen will cure a darker color. Several

factors can influence leaf content of nitrogen:

- Nitrogen fertilizer rates. Research has shown a relationship between increased rates of nitrogen and increased presence of dark colors. However, use of excessive rates above those recommended will likely cause green tobacco at maturity and increase leaching losses of nitrogen.

- Time of topping (early topping is likely to lead to a higher leaf content of nitrogen, and consequently, to darker colors).

- Stalk position of the leaf (upper leaves contain higher amounts of total nitrogen, and thereby cure darker).

• Use of molybdenum in setter water (molybdenum aids in nitrogen nutrition of the plant and reduces the nitrate nitrogen content of the leaf, thereby increasing the likelihood for darker leaf colors).

Potassium Rates and Sources

Recommended rates of potassium fertilizer are more likely to result in burley leaf with high Federal grades and good burning characteristics. When applied in the spring, sulfate of potash produces leaf of higher quality and of more uniform color than muriate of potash. Muriate of potash applied in the spring is almost sure to lead to a high percentage of M (mixed color as opposed to the other "M" mixed grades) and K (variegated) grades. If muriate of potash is used, it should be applied before January 1 of the crop year.

Variety Grown

Varieties may differ significantly in the style, color, and appearance of tobacco that is produced. Many factors can influence the color and quality of cured leaf produced from a specific variety. However, some

varieties have a tendency to produce red, heavy bodied leaf and others may produce more light, thin bodied leaf. Many of the varieties that have been introduced recently were developed prior to the current shift in market preference for darker leaf. However, some varieties like R 610, R 141, Hybrid 403, KY 14 X Burley 64, and N 88 have a tendency to produce the type of cured leaf that is preferred by buyers. Although use of R 610 has some other disadvantages, it is more likely to maintain higher quality than many other varieties.

Many varieties have a tendency to be light colored when cured. Some may produce a "flashy" colored tobacco. The variety TN 86 is an example of a variety that often cures to produce more mixed color (M) and K grades than those mentioned above. It became popular due to superior disease resistance and a general lack of concern for quality (almost all burley leaf sold for the same price) soon after its release in 1986. Although TN 86 was used to transplant 15% of the 1992 crop, preliminary sales for 1993 indicate that its popularity has declined significantly. TN 90 has comparable disease

resistance to TN 86, and preliminary evaluations indicate that the cured leaf color will be redder.

Several of the new hybrid varieties have TN 86 as a parent and others have TN 86 in their breeding history. While not all of these varieties have been fully tested for quality, some do produce a light colored tobacco similar to that seen in TN 86. NC BH129 tends to be bright colored, but the off-colored characteristics seen in TN 86 are not common.

Some other varieties tend to possess colors that are not considered favorable on the burley market. Cured leaves of Hybrid 501 tend to have light tan color, while R7-11 leaves often have pink color. Although some domestic companies will buy tobacco with a pink color, others including those buying for the export market, prefer not to buy it. The pink color has been associated with high nitrosamine levels in some studies. R7-11 is a good yielding variety, but the tendency to cure pink has hurt its popularity.

A dark color after curing is not always considered good quality. Many producers changed back to old varieties in an attempt to achieve a dark

color. Varieties like KY 9, KY 10, and Burley 21 X KY 9 were selected by producers due to the dark color traditionally associated with the cured leaves of these varieties. University tests which included these varieties confirmed that they produced a dark colored tobacco. However, in the cases of KY 9 and Burley 21 X KY 9, the dark color was associated with other characteristics that resulted in a low Federal grade. In addition to poor quality, the yield and disease resistance of both varieties were lower than new and commonly used varieties. To achieve the desired quality, the tobacco must have a uniform tannish-red color.

Timing of Topping

Regardless of the variety grown, topping at the right stage of plant development can improve color. Even varieties that have a tendency to be light in color will produce a redder tobacco if topped at a 10 to 25% bloom stage. Many of the new varieties have different management requirements than older varieties for the production of high quality leaf. Late maturing varieties like TN 86 and KY 8959 respond favorably to topping when plants are in the

elongated bud stage. All other varieties should be topped when no more than 25% of the plants have one flower open. Although there are many reasons for topping at 10 to 25% bloom, topping at the proper time is essential for improving the color of varieties like TN 86, KY 8959, NC BH129, Hybrid 501, and R7-11.

Growing Season Climate

Cooler than normal growing seasons may result in more ammonium nitrogen in the root zone and less nitrate nitrogen than normal. This can result in a greater uptake of ammonium nitrogen that could likely darken leaf color. Growing seasons with above normal rainfall may lead to leaching of soil nitrogen and result in leaf of lighter color.

Summary

There is not a lot of scientific evidence regarding factors that can be managed to *predictably* result in dark and red colors in cured burley leaf. Evidence available indicates that management to increase plant nitrogen content will result in darker colors, whereas excessive potassium content

may result in somewhat lighter colors. Spring applications of muriate of potash are not recommended. Variety and time of topping can both affect color. While all these factors can have effects, climatic conditions during curing are likely to have the greatest effect on cured leaf color.

Growers should note that color is only one factor of leaf quality which graders and buyers assess. Leaf size, finish, body (thickness), stalk position, soundness, odors, and foreign matter are also taken into account. Producers should attempt to grow high yielding varieties and manage them to produce high quality leaf in order to attain maximum returns.


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