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Efficacy of Sucker Control Method and Effect of Topping Height on Axillary Bud Growth in Dark Fire-Cured Tobacco

Leslie Thompson
Western Kentucky University

EFFICACY OF SUCKER CONTROL METHOD AND EFFECT OF TOPPING HEIGHT ON AXILLARY BUD GROWTH IN DARK FIRE-CURED TOBACCO

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Leslie Amanda Thompson
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Directed by: Dr. William T. Willian, Dr. Rebecca Gilfillen, and Dr. Byron Sleugh

Department of Agriculture Western Kentucky University

The removal of terminal buds (topping) and sucker control are two practices that have an impact on yield and quality of dark tobacco (*Nicotiana tabacum* L.). Topping breaks apical dominance and encourages the growth of axillary buds (suckers). Following topping, growth regulator chemicals known as suckercides are commonly used to prevent axillary bud growth. Research has demonstrated that topping time, height, and sucker control method influence the quality and yield of the final product.

Delaying topping past a critical developmental stage has been shown to reduce leaf yield. Topping height varies among geographical regions with most dark tobacco producers topping to a height of 12 to 16 leaves. Previous studies indicate that plants topped to 16 leaves had higher leaf yields than those topped to 12 leaves if late-season soil moisture was adequate. The opposite effect was observed when late-season soil moisture was below average because the small upper leaves on plants topped to 16 leaves did not receive the moisture needed for proper development. The moisture they did receive could have been diverted to improve the yield and quality of the larger, more valuable leaves if the smaller ones had been removed.

Several options exist for chemical control of tobacco axillary buds ranging from contact to systemic materials. Performance of these materials is influenced by several factors including environmental conditions prior to and following application.

Research plots were established at Western Kentucky University's Agricultural Research and Education Complex in Bowling Green, Kentucky to evaluate the efficacy of various sucker control methods and evaluate the effect of topping height on axillary bud growth. Data collection was completed in the summer of 2000. Three sucker control methods and three topping heights were investigated. The first sucker control method was a single application of a local systemic suckercide at topping. The second method was a sequential application using a contact suckercide at topping followed by a local systemic applied seven days later. The third method, which served as the control, was topping the plants but not applying any suckercides. The experiment utilized a split-plot design with 9 treatments and 4 replications. The plots consisted of two 7 m rows per plot, with 102 cm row spacing and 89 cm in-row spacing. Data collected include number of suckers per plant and kilograms of sucker biomass per plant.

Statistical analysis indicated no sucker control method by topping height interaction; thus sucker control and height data are discussed separately. Suckers per plant and sucker biomass per plant did not differ among those plots receiving a suckercide application. Topping height did not influence sucker number or biomass.

CHAPTER I

INTRODUCTION

There are various dark tobacco types produced in the United States and worldwide, though dark fire-cured is primarily produced in Tennessee, Kentucky, and Virginia, USA. This type of tobacco is used for snuff and plug chewing tobacco and is characterized by its distinct aroma which comes from the open hardwood fires used during the curing process. Dark tobacco derives its name from the dark green color of the leaves, a result of the high amount of chlorophyll found in this type. Production practices in tobacco vary based on the type of tobacco being produced. In dark tobacco production, topping and sucker control are two practices that have an impact on leaf yield and quality (Miller & Fowlkes, 1999).

Tobacco, unlike many other crops, is primarily used for combustion. For this reason, the valuable portion of a plant is the cured leaf (Tso, 1999). The value of these leaves is based on their size, thickness, color, and aroma. Topping a plant affects these variables in numerous ways, such as increasing root growth and nicotine synthesis, improving drought tolerance and leaf expansion, and increasing leaf thickness (Maksymowicz, 1993). Topping a tobacco plant involves removing the reproductive portion of the plant. At topping the flower, also known as the terminal bud, and the small upper leaves are removed. This procedure breaks apical dominance which results in rapid sucker growth. At the same time or shortly after the plants are topped, any suckers or secondary shoots that are already growing at the leaf axil are removed manually or are treated with chemicals that will suppress their growth (McKenzie et al., 1998). Both of these steps are taken to divert resources that would be used in the production of these reproductive plant parts and small secondary leaves to the valuable primary leaves. The timing, technique, and method chosen during these steps are of the utmost importance to ensure maximum leaf yield and quality.

The physiological stage of the plant at topping time is very crucial. If topping is accomplished at the proper time then less lodging, better sucker control, less insect problems, better quality, and greater yields will be realized (Maksymowicz and Palmer, 1997). Not all types of tobacco should be topped at the same stage. The most appropriate topping stage for dark tobacco is at the bud elongation stage (Maksymowicz, 1997). A topping height of 12 to 16 leaves remaining is recommended depending on variety and weather conditions in the area.

Sucker control generally begins at topping time. Producers' sucker control practices vary considerably. Some use sequential topping and suckercide application programs while others implement a single topping and suckercide application program. Many producers wait until 50% of the plants in a given field have begun to bloom before performing the first topping in order to reduce the number of toppings. Regardless of the program, three types of sucker control compounds exist. Fatty alcohol contacts kill suckers on contact. Local systemic suckercides inhibit cell division but are not translocated throughout the entire plant. Systemics, the third type, contain the active ingredient maleic hydrazide, and they also inhibit cell division, but are translocated within the entire plant (Miller & Fowlkes, 1999).

The objectives of this research project were:

(a) to evaluate the efficacy of various sucker control methods and

(b) to evaluate the effects of topping height on axillary bud growth.

CHAPTER II

LITERATURE REVIEW

History of Tobacco

Nicotiana tabacum is native to Mexico and South America and was one of the first observations Columbus documented about the Native Americans upon his arrival on October 15th, 1492 (Borio, 1995). This member of the Solanaceae family became the preferred form of tobacco grown by the Jamestown settlers. Its use spread rapidly among the Spanish settlers, and by the mid-16th century it was being produced in small quantities all over Europe. Originally Europeans found medicinal uses for the herb, but by the 17th century the practice of inhaling its smoke became an activity of leisure. Toward the end of that century the inhalation of smoke from tobacco became known as "smoking." Meanwhile, in France the plant became known as nicotiane named after the ambassador Jean Nicot who introduced tobacco to the French court. This term eventually became the scientific name and was even used to identify the psychoactive ingredient in tobacco commonly known as nicotine. The Amerindian term *tabaco* was adopted by most languages and is thought to identify one of the instruments used to smoke the cured leaves (Wyckoff, 1997).

Classification of Tobacco

The majority of commercially produced tobaccos in the world are *Nicotiana tabacum*. One other species, *Nicotiana rustica*, is produced on a very limited scale.

Each type of tobacco is named primarily for the system of production and curing method. Use such as cigarette, cigar, pipe, and chewing also play a role in classification. Once the tobaccos are separated by curing method and use, they are then divided into categories by country and even by specific growing regions. The primary types of tobacco produced are dark air-cured, dark fire-cured, dark air/sun-cured, flue-cured, and light air-cured. In 1996 the USDA reported that flue-cured tobacco accounted for over 63% of the volume of tobacco produced with dark fire-cured tobacco accounting for only 0.8% (Tso, 1999).

Dark Fire-Cured Production Practices

Many factors play a role in the production of all types of tobacco. As with any crop, consideration must be given to quality seed, proper establishment of plants, determining appropriate plant populations, nutrient management, and pest control. However, a producer must also choose an appropriate topping time, topping height, and sucker control method, which is unique to tobacco production. Once these factors have been determined, the quality of the final product can still be greatly affected by the curing process--especially when working with dark fire-cured tobacco. Curing this type of tobacco is often thought of more as an art than a science (Miller & Fowlkes, 1999)

Topping

Once an appropriate variety has been selected, transplanting has occurred, and any necessary pest management issues have been addressed, the next step is topping.

This removal of the reproductive portion of the plant and small upper leaves diverts needed resources to the developing leaves. The plant hormone auxin is produced in meristematic tissues and functions to suppress the growth of the axillary buds or suckers (Flower, 1999). Topping the plant reduces the production of this hormone and stimulates root growth. Cytokinin is produced in the roots of the tobacco plant and functions to encourage axillary bud growth. The change in ratio of these two hormones causes rapid sucker growth.

Choosing an appropriate developmental stage and height can result in higher leaf yield and quality by increasing the leaf area, weight/unit area, and nicotine concentration. This stage in dark tobacco, characterized by the bud being elongated barely above the smallest upper leaves and prior to flower opening, is known as the bud elongation stage. Studies show that tobacco yield can be increased by 136 kg ha^{-1} on average when topped at this stage versus topping when the flower has fully bloomed (Maksymowicz, 1997). When removing this terminal bud the amount of small upper leaves to be removed with it should be determined by moisture expectations. Choosing a height of 14 leaves remaining is appropriate for moderate moisture conditions while 16 leaves is generally reserved for producers who are capable of irrigating (Miller & Fowlkes, 1999). Producers prefer a single topping; however due to fertilization, different varieties, diseases, weather, nutrition, and soil characteristics plants can exhibit uneven growth and development thus requiring two to three toppings per growing season.

Dark tobacco should stand in the field for a minimum of 4 weeks after topping because leaf yield and quality continue to improve for 6 to 8 weeks (Maksymowicz, 1997). Normally dark tobacco ripens within 3 to 5 weeks after topping (Miller &

Fowlkes, 1999). During this time chemical and physical properties such as increases in leaf area will be affected in those leaves that were less than 85% of their full size at topping (Flower, 1999). The upper leaves of plants that are topped, especially those topped in a timely manner, are much heavier and thicker at harvest than those plants that are not topped. This difference is due to the fact that at normal topping time these upper leaves are in the greatest need of nutrients, water, and sunlight. The lower primary leaves have had time to develop fully prior to axillary bud and flower development. Smaller young leaves would have to compete for resources if the plant was not topped. Also, topping improves drought tolerance, slows leaf senescence, and increases nicotine concentration (Flower, 1999). Dark air-cured and fire-cured tobaccos are topped earlier and at lower heights than are flue-cured tobaccos--simply because dark tobaccos are expected to have thicker, broader leaves with a higher nicotine content (Flower, 1999). Burley tobacco, a form of light air-cured tobacco, is topped even higher than flue-cured or dark tobaccos (at about 24 leaves). It is generally grown on fertile soil producing high yielding, well developed, light-bodied leaves containing medium-to-high nicotine concentrations.

Sucker Control

Any positive effects achieved through proper topping techniques can be offset by lack of effective sucker control practices. Once a plant has been topped and apical dominance has been broken, immediate sucker control measures must be taken at this time to ensure high quality and yield. If suckers are not controlled, they will rob the primary leaves of needed nutrients. These axillary buds will not only inhibit the development of young marketable leaves but they will also have an impact on the chemical composition of the upper leaves. Previous research has indicated that there is a positive relationship between good sucker control and the flavor of tobacco smoke (Weeks and Seltman, 1986). There are various ways to remove suckers and/or control their growth. A task that once required a significant amount of manual labor is now controlled by more efficient chemical means. Chemical control can be accomplished with the use of growth regulators or suckercides known as fatty alcohols or "contacts," local systemic chemicals, or systemic chemicals (Maksymowicz, 1997). However, type and physiological stage of the tobacco, soil moisture, and application method all play a role in choosing an appropriate suckercide.

Fatty Alcohol Contacts

Fatty alcohol contacts must be applied so that the sucker buds are directly contacted and saturated with the chemical. Application must be in a manner that encourages proper drainage down the stalk into each leaf axil (Peedin, 1999). Buds that are < 2.54 cm long are usually killed within one hour of application (Maksymowicz, 1997). The rapid action of this type of product prevents contact suckercides from being susceptible to rainfall as long as precipitation does not occur within an hour following application. Contacts are most effective when applied at the button to elongated button growth stage (Miller & Fowlkes, 1999).

This form of suckercide works best before sucker initiation and is unlikely to control axillary buds > 2 cm long. For optimum control these axillary buds need to be removed manually at topping (Palmer & Pearce, 1999). However, if fatty alcohol contacts are the only method of suckercide used, the producer may not achieve satisfactory results (Miller & Fowlkes, 1999). Even one-sucker varieties can have 3 to 4 axillary buds per leaf axil; therefore, all varieties require 2 to 3 applications that occur 3 to 7 days apart when using a contact suckercide. For best results, a sequential application of a local systemic or systemic suckercide should be used in conjunction with a contact chemical (Maksymowicz, 1997). With this method any buds < 2.54 cm that had not emerged or were not directly contacted during the first application will be controlled by the local systemic or systemic product. Also, local systemic and systemics have residual effects to allow for control of potential suckers within the axil. This combination will also aid in improving uniformity of irregular bloom stages within a crop, if only those plants that are at the desirable stage are topped and treated (Palmer & Pearce, 1999). For this reason, the use of a contact chemical is sometimes combined with the use of a local systemic chemical.

Local Systemics

Local systemic chemicals are absorbed by meristematic tissues of the plant and inhibit cell division in leaf axils that are directly contacted. These chemicals are most effective when applied in a method similar to that of fatty alcohol contacts due to the necessity of their contact with the leaf axil to ensure maximum efficacy. A common application method consists of pouring a 2% solution over the top of the stalk, averaging about 20 ml of solution per plant. Over applying should be avoided to prevent excess soil exposure that could be damaging to cover crops and rotational crops. Proper coverage provides control for 6 to 8 weeks (Palmer and Pearce, 1999). Typically local systemics are not applied to plants that have not yet reached the bud elongation stage because they will have the same effect on cell division in the young maturing leaves as they have on the axillary buds (Miller & Fowlkes, 1999). The most commonly used local systemics are dinitroanalines such as flumetralin, butralin, and pendimethalin. Although most dark tobacco producers feel that local systemics are effective for season-long sucker control, they commonly apply them following a previous contact suckercide treatment. Some researchers have recommend tank mixing flumetralin with a 4% fatty alcohol. This method produced better sucker control and leaf yield than did flumetralin alone (Jones and Rideout, 1986). Another option in using local systemics is that of combining them with a systemic suckercide (Miller and Fowlkes, 1999).

Systemics

In the 1950's the synthetic growth regulator, maleic hydrazide (MH), was commercialized and is now the active ingredient in the group of suckercides known as systemic chemicals. Maleic hydrazide suppresses sucker growth and can be applied to the plants either before or after they are topped (Atkinson et. al., 1983). Although maleic hydrazide is an effective sucker control agent, it is not commonly used as a single control method in dark tobacco due to its tendency to discolor the top leaves of the plant, thus reducing leaf quality (Miller & Fowlkes, 1999). Maleic hydrazide is absorbed by the leaves and travels through the plant inhibiting cell division in meristematic tissues. At the early topping stage generally chosen in dark tobacco, applying maleic hydrazide may stunt plant growth in those leaves that are < 20 cm long. The only growth that occurs after maleic hydrazide application is due to expansion or elongation of preexisting cells (Miller & Fowlkes, 1999). Any suckers that are > 2.54 cm will not be adequately controlled; therefore, they need to be removed by hand prior to suckercide application (Atkinson et al., 1983). If a systemic is used alone or as a sequential treatment in dark tobacco, the recommended application is in the form of a fine mist at a rate of 14-19

L ha^{-1} in 151-189 L of water. It is only necessary to cover the upper 1/3 to 1/2 of the plant, using 2.8 to 3.5 bars of pressure (Miller and Fowlkes, 1999). Efficacy may be reduced if rainfall occurs within twelve hours of application. Additionally, drought conditions decrease absorption and translocation of systemics (Palmer, et al., 1995).

Topping and Sucker Control Programs

To be successful with dark fire-cured tobacco production, a program must be designed for topping and sucker control--one that incorporates proper topping time and height and the appropriate chemicals for that particular crop. One must take into consideration typical weather patterns, variety, availability of irrigation, and the plant's physiological stage. One recommendation is the use of a contact suckercide directly after the first topping; then make two to three more applications in 5 to 7 day intervals. Generally, topping is completed during the second application. Another alternative is to use a contact chemical at the first topping, then at the second topping (still within five to seven days of the first one) treat the crop with a local systemic or a systemic (Miller and Fowlkes, 1999). The systemic must be delayed as long as possible to avoid yellowing of the immature leaves or reduction in yield. Either of these programs should be effective strategies for topping and sucker control if all necessary factors are considered during the process.

Research was conducted at the University of Maryland to evaluate the effects of applying a local systemic alone versus a contact chemical alone on sucker growth. Both suckercides were applied as coarse sprays at 20 ml per plant at topping. The data revealed the local systemic provided complete control of sucker growth 5 weeks after topping (WAT). Plots receiving a contact suckercide application contained 0.2

suckers/plot and 208.3 grams of suckers/plot 4 WAT and 0.3 suckers per plant 5 WAT which resulted in a sucker biomass of 281.2 grams per plant. Although this particular study was performed using Maryland tobacco, sucker control data was taken at 4 and 5 weeks after topping which is common in dark tobacco. In the Maryland tobacco study the single application of a local systemic was reported as the most effective of all sucker control methods in controlling sucker growth (Bruns, 1987).

There are numerous conditions that affect the quality and yield of a tobacco crop. Effective topping and sucker control is a vital part of a productive program. Monitoring the maturation stage of the terminal bud and leaves is the best method of determining the most appropriate topping time. Making the appropriate considerations in determining the number of leaves that remain following topping is also very important. Finally, the sucker control program that is chosen should be based on possible weather conditions, maturation stage of the suckers and the plant itself, and also the variety and type of tobacco being treated. Much planning, research, and forethought must go in to producing excellent quality, high yielding, dark fire-cured tobacco.

CHAPTER III

MATERIALS AND METHODS

Field studies were established at the Agricultural Research and Education Complex of Western Kentucky University, Bowling Green, Kentucky during the summer of 2000. A split-plot design with 9 treatments and 4 replications was used. Float beds for the hydroponic tobacco plants (cv. 'TN D94') were established on March 18, 2000. Transplants were established on June 1, 2000 in a Pembroke silt loam soil with a pH of 6.0, organic matter content of 1.5%, and cation exchange capacity of 8.4 cmol+/kg. The transplants were established at a population of approximately 10,370 plants/ha with 102 cm row spacing and 89 cm in-row spacing. The plot was divided into 4 replications with 9 plots per replication. Each plot contained two, 7 m rows. Each plot was randomly assigned a topping height of 12, 14, or 16 leaves remaining along with one of three sucker control methods so that each method was applied at each of the different topping heights.

Prior to transplanting, nitrogen as NH_4NO_3 was applied at 279 kg ha^{-1}. Potassium as potassium sulfate was applied at 168 kg ha^{-1} and $CaCO_3$ was applied pre-transplant according to soil test recommendations.

Pest control measures began to be taken while the plants were still in the float bed by applying the fungicide mancozeb. Also, imidacloprid was applied as a drench at a rate of 29.57 ml/1000 plants on May 31, 2000 to control aphid and flea beetle populations. Next, 0.35 kg ai ha^{-1} sulfentrazone, 0.63 kg ai ha^{-1} clomazone, and 0.56 kg ai ha^{-1} metalaxyl were pre-plant incorporated to a depth of 5 cm the day of transplanting to provide control of annual weed species and soil-borne pathogens. Transplant water was treated with 0.54 kg ai ha^{-1} acephate to control soil insects. In season pest control consisted of hoeing, and insecticides were applied as needed.

The first plants to reach bud elongation stage were topped on July 26, 2000. The plots were visually evaluated weekly to determine if any plants had reached the appropriate stage. This approach resulted in 6 different topping dates, with the last of the plants being topped on August 15, 2000. The first suckercide applications were made the same day the plants were topped. Those plants receiving sequential suckercide applications received the second treatment 7 days after topping (DAT). Suckercides were applied manually by pouring the chemical over the stalk. Plants receiving sequential applications were labeled with their topping date and treated one week later. The treatments were applied as follows (Table 1).

Treatments 1-3 consisted of plants topped to 12, 14, or 16 leaves, respectively, with each receiving sequential applications consisting of 20 ml per plant (4% solution) of a fatty alcohol contact, trade name Royaltac-M®, at topping, followed 10 ml per plant (2% solution) of the local systemic butralin, trade name Butralin®, 7 DAT. Plants receiving treatments 4-6 were topped to 12, 14, or 16 leaves, respectively, and received a single application of 10 ml per plant (2% solution) of the local systemic, butralin at topping. Treatments 7-9 were topped but received no suckercide applications. These plots were established as a control (Table 1).

On September 7, 2000 suckers were harvested. The total number of plants per plot was counted. Suckers were removed, bagged by plot, suckers per bag counted, and bags were weighed. This procedure provided data based on average number of suckers per plant and average sucker biomass per plant. Valid yield data could not be collected in this study due to the extensive plant damage during the sucker harvest. Removing suckers the size of those not impeded by the suckercide applications caused damage to the leaves. The tearing and breaking of leaves caused enough damage to likely skew any yield data that would have been taken.

Data were analyzed using the Statistical Analysis System. Analysis of variance was performed to determine sucker control method and topping height effects. There was no sucker control method by topping height interaction; therefore data will be discussed separately by sucker control method and by topping height. Duncan's Multiple Range Test was performed at the 0.01 level in order to separate treatment means.

Table 1. Topping Height and Sucker Control Method

Treatment	Topping Height	1^{st} Application	2^{nd} Application (7 DAT)
1	12	20 ml/plant fatty alcohol contact	10 ml/plant local systemic
2	14	20 ml/plant fatty alcohol contact	10 ml/plant local systemic
3	16	20 ml/plant fatty alcohol contact	10 ml/plant local systemic
4	12	10 ml/plant local systemic	N/A
5	14	10 ml/plant local systemic	N/A
6	16	10 ml/plant local systemic	N/A
7	12	Topped, not suckered	N/A
8	14	Topped, not suckered	N/A
9	16	Topped, not suckered	N/A

CHAPTER IV

RESULTS AND CONCLUSIONS

Sucker Control as Influenced by Sucker Control Method

There was no significant difference in sucker control between plants receiving a single application of the local systemic and those receiving sequential treatments (Table 2). There was a significant difference between those plants receiving suckercide and those topped but not suckered. Plants receiving no suckercide applications averaged 10.12 suckers per plant and 1.11 kg sucker biomass per plant. Plants receiving the single application of a local systemic at topping averaged 1.60 suckers per plant and 0.24 kg sucker biomass per plant. This outcome was an 84.2% reduction in number of suckers per plant and a 78.3% reduction in sucker biomass per plant as compared to those plants that were topped but received no suckercide treatment. Plants receiving sequential treatments averaged 1.09 suckers per plant and 0.13 kg sucker biomass per plant. This result was an 89.2% reduction in number of suckers per plant and an 88.1% reduction in sucker biomass per plant as compared to those plants that were topped but received no suckercide treatment.

Table 2. Sucker Number and Biomass as Influenced by Sucker Control Method

Application		Suckers/Plant		%Reduction	
1st	2nd	number*	biomass (kg)	number	biomass (kg)
Local Systemic	None	1.60b	0.24b	84.2%	78.3%
Contact	Local Systemic	1.09b	0.13b	89.2%	88.1%
None	None	10.12a	1.11a	N/A	N/A

*Means with the same letter are not significantly different (P[0.01)

Results indicated the single application method was just as effective as the sequential application method. Local systemics provide 6-8 weeks of sucker control if applied properly. After tobacco plants were topped and treated, they remained in the field 3-6 weeks before the sucker control data was obtained. Those plants receiving the fatty alcohol contact application one week before the local systemic application were provided with an additional week of control, but if the plants are harvested within 6-8 weeks of topping this additional week of control may not be necessary. The residual effects of the local systemic may help to explain why the single application method was as effective as the sequential application method.

Bruns reported that a single application of a local systemic provided the most effective sucker control 5 WAT in Maryland tobacco (Bruns, 1987). In this dark-fire cured tobacco study we collected sucker control data within a similar time frame. In the interim between topping and appropriate harvest time, both experiments indicated that a single application of a local systemic provided equivalent or better control than did the other methods investigated.

Sucker Control as Influenced by Topping Height

Data collected on sucker number and biomass as influenced by topping height included data from plots that were topped but received no suckercide treatment; therefore, values are higher than those from the sucker control method data.

There was no significant difference between topping height effects on sucker control (Table 3). Plants topped to 12 leaves remaining averaged 4.41 suckers per plant and 0.52 kg sucker biomass per plant. Plants topped to 14 leaves remaining averaged 4.40 suckers per plant and 0.54 kg sucker biomass per plant. Plants topped to 16 leaves remaining averaged 4.03 suckers per plant and 0.43 kg sucker biomass per plant.

Regardless of topping height the same amount of resources will be utilized for sucker production within the plants. Plants topped to 16 leaves, though, will have more leaf axils to produce suckers than plants topped to 12 leaves remaining. This higher topping height could cause suckers to be smaller, yet more suckers could develop on a 16 leaf plant. In theory, total sucker biomass of a 16 leaf tobacco plant should not be different from that of a 12 leaf plant. Moreover, if the same amount of suckercide material is applied at all topping heights the chance of excess material pooling at the base of the stalk increases with shorter plants. Soil residues of local systemics μ 0.05 ppm have been shown to reduce shoot and root growth of subsequent monocot crops (Rawls, 1986).

Table 3. Sucker Number and Biomass as Influenced by Topping Height

Topping Height (leaves remaining)	Suckers/Plant	
	number*	biomass (kg)
12	4.41a	0.52a
14	4.40a	0.54a
16	4.03a	0.43a

*Means with the same letter are not significantly different (P[0.01)

CHAPTER VI

SUMMARY

A variety of chemical options exist for sucker control, and even more options can be created when these chemicals are used sequentially or in combination with each other. Sucker control options for dark tobaccos are limited when compared to other types of tobacco due to the effects systemics can have on dark tobacco leaf quality. The use of a local systemic alone or sequentially following a fatty alcohol contact application are only two options for sucker control.

No difference was observed between the single application sucker control method and the sequential application method. One application of a local systemic proved just as effective as two suckercide applications which would involve more labor, time, and money. Based on this data a producer could reduce time inputs, labor costs, and chemical expenses by treating once per season, instead of twice. Also, plants would incur less damage because fewer trips would be made through the field. Another indication made by these results is that topping height decisions can be based solely on moisture expectations, which supports previous unpublished research by Miller.

If this research were performed using a different variety, under different weather conditions, or perhaps on a different soil type the results could vary. Future research utilizing other sucker control methods such as tank mixtures of fatty alcohol contacts and local systemics or sequential suckercide applications using fatty alcohol contacts and/or local systemics in conjunction with maleic hydrazide could benefit producers. Producers often tank mix a contact chemical with a local systemic or maleic hydrazide. Considering that the local systemic or systemic chemical should control those suckers contacted, as well as potential suckers, the benefits of tank-mixing a contact could be studied as a means to determine whether this method improves control on a consistent basis. Any research that would suggest ways to reduce the amount of chemical applied and/or the number of applications necessary would result in less expense. Decreasing production expenses while still producing a high quality, high yielding leaf allows for a greater net gain which is a producer's ultimate goal.

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