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BY
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Use of Sucker Control Materials on Burley and Dark Tobacco

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Maleic hydrazide (MH-30) and various emulsifiable mineral oils have been used in sucker control experiments for the past several years. Both types of materials have given good sucker control when properly used.

The action of these two materials in controlling the growth of the sucker buds is entirely different. When sprayed on plants, MH-30 moves into the leaves directly through the outer or epidermal tissue and is translocated to other parts of the plant. It prevents further cell division with the result that sucker growth is reduced. However, the cells already formed are not prevented from enlarging. Emulsifiable mineral oil is not absorbed by the plant. The oil prevents sucker growth on tobacco by killing the sucker buds upon contact. Therefore, it is necessary for the oil emulsion to contact each sucker bud in order to obtain the desired control.

MALEIC HYDRAZIDE (MH-30)

Burley Tobacco

The use of MH-30 on burley tobacco is not recommended because some cigarette manufacturers have indicated that tobacco treated with MH-30 is less desirable than untreated tobacco for making cigarettes.

The information presented in this circular **does not** constitute a recommendation by the Kentucky Agricultural Experiment Station or the Kentucky Agricultural Extension Service for the use of any of the materials discussed on either burley or dark tobacco. It is presented to summarize briefly the results obtained from the experimental use of maleic hydrazide and emulsifiable mineral oil on burley and dark tobacco.

It has long been known by tobacco growers that topping and suckering burley tobacco usually results in a heavier-bodied leaf that possesses more aroma and is higher in nicotine. Keeping the suckers reduced in size and number through the use of MH-30 and oil emulsions produces similar but somewhat modified results. The following table gives a summary of three years of tests on burley tobacco at different locations.

<i>Treatment</i>	<i>Total Suckers Removed per Plant</i>	<i>Yield Lb/A</i>	<i>Per Cwt</i>	<i>Per Acre¹</i>	<i>Percent Total Alkaloids²</i>
Topped, not suckered	5.8	2,128	\$57.00	\$1,212	3.68
Topped, hand suckered weekly	2,417	56.60	1,368	4.55
Topped, MH-30 treated	1.4	2,491	56.90	1,418	4.13
Topped, oil treated	2.0	2,430	55.20	1,341	4.02

¹ Acre-value and average price per 100 pounds are calculated using the average market prices paid during the years 1946 through 1953, inclusive; consequently, these values are lower than the actual values for the three years.

² Total alkaloids represents nicotine plus other alkaloids and thus is a larger figure than nicotine alone.

Since the upper leaves of the tobacco plant should continue to enlarge, or spread, after topping, spraying with MH-30 should not be done until the uppermost leaves to be saved are about 6 inches long. When the uppermost leaves are this size, all of the cells usually will have been formed and can expand in a normal way. Also, any suckers present that are 1½ inches long or longer have completed cell division and will continue to grow by cell enlargement if not removed at the time of spraying.

The suckers produced after treatment with MH-30 are abnormal or distorted in appearance, greatly reduced in size, and much easier to remove than suckers on untreated plants.

Method and Time of Application

All experimental work at the Kentucky Agricultural Experiment Station with MH-30 has been done using a knapsack-type sprayer with a pressure gauge. On large acreages other types of sprayers (tractor-mounted, self-propelled Hi-boy, and airplane) have reportedly been used successfully. The application of the proper amount of diluted MH-30 in a fine spray to cover the upper 6 or 8 leaves of the plant soon after topping gave the best sucker control.

The tobacco should not be topped before at least ¾ to ⅘ of the plants are in bloom. Then the plants should be topped to at

least a 6-inch leaf. If smaller leaves are left on the plant they will usually be malformed and of little or no commercial value.

Rate of Application

On average size tobacco, 4 feet tall after topping, spaced 18 inches apart in rows 42 inches wide for a total of 8,300 plants per acre, 4 quarts of MH-30 per acre gave satisfactory sucker control. If the tobacco is substantially larger or if more plants per acre are grown, 5 quarts per acre may be required.

Precautionary Measures

1. The required amount of MH-30 should be mixed with not less than 20 gallons of water per acre to prevent burning of the leaves by the chemical.

2. The uppermost leaves to be saved should be at least 6 inches long before treatment.

3. If rainfall occurs within 12 hours after treatment, it may be necessary to repeat the application. Generally if the material remains on the plant for 12 hours or longer, enough will be absorbed to give good results.

4. The upper leaves of burley tobacco treated with MH-30 often start to yellow in about 7 to 10 days after spraying. This may at first be confused with ripening but as yellowing continues, the leaves usually have a distinctly different appearance, sometimes taking on a dull, yellowish-white color. For this reason some untreated plants should be left in the field to determine when the tobacco is mature enough to harvest.

Dark Tobacco

The use of MH-30 is not recommended for dark tobacco because no manufacturers' evaluation of the treated leaf has been obtained.

Tests have been conducted at the West Kentucky Experimental Substation for the past 5 years on various methods and rates of MH-30 for control of suckers on dark tobacco. Very good control has been experienced with no apparent damage to the yield or market quality of the tobacco. In certain years the use of MH-30 has resulted in greater yield and improved quality, while in other years there was no significant difference in yield or market quality between treated tobacco and the check or hand-suckered tobacco. The following table gives a summary of results for the past four years:

<i>Treatment</i>	<i>Total Suckers Removed per Plant</i>	<i>Yield Lb/A</i>	<i>Per Cwt</i>	<i>Per Acre</i>
Check, hand suckered	22.5	1,668	\$31.41	\$524
MH-30-1 gal/acre	8.3	1,799	33.18	597
MH-30-1½ gal/acre	2.5	1,799	33.41	601

Method and Time of Application

The method of application is the same as for burley tobacco. The material should be applied immediately following topping, preferably the same day. If application is delayed until sucker buds begin to emerge, they will continue to grow to some extent. These suckers will be greatly distorted in growth and slow growing but will usually need to be removed before harvest.

Rate of Application

The most effective rate was found to be approximately 1½ gallons of the material applied in 20 to 40 gallons of water per acre, sprayed on the top one-third to one-half of the plant immediately after topping. One gallon of the material per acre gave good control in dry seasons but its effectiveness was lost after about 3 weeks, when rainfall is normal. Only one application was needed if no rainfall occurred within 12 hours after treatment.

Precautionary Measures

1. MH-30 should not be applied if rain is expected within the next 12 hours.
2. Do not treat the tobacco on bright days with the temperature above 90° F, because damage from scalding may occur. (This is likely with any type of spray at such time.)
3. The top leaf should be approximately 6 inches long or longer before treatment. There is usually some distortion of the top leaf if it is smaller than this when treated.

Some Practices Which Were Found to be Ineffective

1. Removing the first suckers by hand and then treating with MH-30 was found to be of little benefit. The suckers which are too small to be removed by hand at the first suckering will continue to develop and need to be removed later.
2. Applying concentrated material directly to the topped stalk caused the top one to two leaves to fall off on many plants and had little effect on sucker growth.
3. Treating untopped tobacco was found to be ineffective.

MINERAL OIL EMULSIONS

Various emulsifiable mineral oils have been used in sucker control tests with varying degrees of success; however, results have generally been less effective than when MH-30 was used. The oil emulsions prevent sucker growth by killing the young sucker buds upon contact.

Burley Tobacco

To be effective in sucker control, the oil emulsion must come in direct contact with all of the young sucker buds on the plant. All these buds may not be reached if a stalk of tobacco is leaning or if not enough emulsion is used to reach those buds near the bottom of the stalk. However, if so much of the emulsion is applied that it accumulates at the ground level, stalk rot may begin at that point.

Rate of Application

The best results were obtained when approximately $\frac{3}{4}$ teaspoon of emulsion (half oil and half water) was used per plant. This will vary slightly if the tobacco plants are larger or smaller than normal. This means that treating an acre of burley tobacco, 8,000 to 8,300 plants per acre, would require about $3\frac{1}{2}$ gallons of oil. The oil must be diluted half and half with water and shaken well to form a milky-white emulsion before applying.

Method and Time of Application

Several types of applicators are available for applying oil emulsions but no one was superior to the exclusion of others. The important factors found were (1) a uniform application per plant must be obtained, (2) splattering or dripping of emulsion on the leaves must be kept at a minimum, and (3) sufficient oil must be applied to reach the sucker buds at the ground level, but not enough to cause a large accumulation at that point.

Tobacco to be treated with an oil emulsion should be topped at the usual time in the usual way and all suckers removed that are $1\frac{1}{2}$ to 2 inches long or longer. The oil emulsion should be applied as soon after topping as possible, preferably the day of topping. The emulsion should be applied to the end of the stalk where the top has been removed in such a way that the material will run evenly down the stalk and contact as many sucker buds as possible.

Precautionary Measures

1. Care should be taken to ensure that drops of the emulsion do not fall or splash onto the leaves, for this will result in burning injury.

2. Rain within 12 to 24 hours after treatment may reduce the effectiveness of the material used.

3. Some leaf drop (loss of leaves due to rotting of the stem at its junction with the stalk) may occur when oil emulsions are used. Observations from the work conducted on Experiment Station farms indicate that leaf drop may be associated to some extent with weather conditions following treatment. Periods of extremely hot weather, when humidity also is very high, appear to cause more leaf drop. Emulsifiable oils are now available that have been developed for the purpose of reducing leaf drop.

4. Waste oils, motor oils or any other type of oil not produced for the specific purpose of sucker control on tobacco plants should not be used.

Dark Tobacco

Different oil emulsions and various rates have been used for sucker control on dark tobacco the past four years. Results have never been as good as with MH-30 and very erratic results have been experienced, depending on the season. In certain years a number of ground suckers were produced by tobacco treated with oil emulsions. The oil must reach the axil of every leaf to kill the sucker buds, since it is not translocated throughout the plant. (See also section of oil emulsions on burley for precautionary measures).

Effect of wet or dry weather immediately following treatment with oil emulsions, on control of suckers, is shown by the following data:

	<i>Total Number of Suckers Removed per Plant</i>	
	<i>Oil-treated</i>	<i>Untreated</i>
Dry (1953)	1.9	15.6
Wet (1954)	9.9	29.7
Wet* (1957)	23.5	23.8

* One inch of rain fell during 24 hours following treatment.

The oil emulsion is usually applied at the top of the stalk after topping and allowed to run down. Thus the oil does not reach

all the axils unless the plant is almost perfectly straight. There is usually some loss of leaves from tobacco treated with oil.

Method and Time of Application

Dark tobacco to be treated with oil emulsion should be topped at the regular time. The emulsion made from mineral oil is applied to the top of the stalk and allowed to run down. It is better to remove the tops by cutting rather than by breaking out, so as to leave a smooth surface on which to apply the emulsion. Care must be exercised to have the emulsion run down all sides of the stalk to contact all sucker buds.

Rate of Application

Approximately one teaspoon of emulsion is needed per plant. An acre of dark tobacco (3,600 plants) will require about $2\frac{1}{3}$ gallons of oil. The oil should be mixed with an equal volume of water and shaken well to form a milky-white emulsion before applying.