1960 TOBACCO INFORMATION

INTRODUCTION

It becomes increasingly evident that the success and future of the tobacco industry, at all levels, is dependent upon gaining the active support of all groups who share the responsibility for one phase or another.

Simply talking about the quality, production and marketing practices and the failure of the other man to make improvements will not get the job done. Each person or organization must do their part.

The agricultural, industrial and allied groups involved in tobacco must form an agro-business partnership. They must join in a cooperative effort to exercise the leverage that each group has in bringing about the improvements needed in all areas of the tobacco program.

1. Tobacco prices paid by the companies need to realistically reflect desirable and undesirable characteristics of tobacco presented at the market place. This is true for all buyers. Too frequently, market prices ignore mixed grades, pale, slick tobacco, thread, large hands, etc. Yet, these are things often criticized by buying interests.

2. The tobacco grading system needs to describe the quality characteristics of each basket of tobacco. The grade should identify desirable and undesirable characteristics that are important to the trade and consumer. Too frequently, mixture, thread, large hands, slick, toady, pale tobaccos may not be identified as such.

3. The price support program needs to reflect the desirable and undesirable characteristics of tobacco. The support price has a great deal of influence at the market. It is just as important for the price supports to encourage desirable quality, good handling, etc., as it is for the buyers to do so.

4. The acreage control program needs to be as realistic and as accurate as possible in line with effective supply and demand in the domestic and foreign market. We must be aware of the effect on our own industry from the quality, price and production costs of tobacco produced in foreign countries and from regulations, laws and tariffs in importing countries.

5. The tobacco warehousemen and the Department of Agriculture both have very important roles and responsibilities in a cooperative effort to improve and build the tobacco program. Their support of a coordinated effort is important.

RESULTS OFFICIAL TOBACCO VARIETY TEST-1960

Whiteville, Rocky Mount, Clayton, Oxford, Rural Hall

Variety	Yield Lbs/A	Value $/A	Index[1] $/Cwt.	Qual. Index	Suckers per Plant Ground	Suckers per Plant Leaf Axil	No. of leaves per plant	Ht. of plant (in.)	Days to Flower	Red. Sugar %	Nic. %	Ratio N/Nic.	Resistance[2] B. S.	G. W.	F. W.	Brown Spot Index[3]
Hicks B. Leaf	2102	1344	63.84	60	1.6	22.3	18	42	46.6	17.63	2.75	.76	S	S	L	48
Vesta 5	2185	1302	59.42	40	3.0	21.3	18	50	49.8	17.34	2.97	.76	M	S	S	48
Coker 187	2090	1166	56.37	28	.9	16.8	20	51	52.4	15.59	2.87	.79	H	H	L	61
McNair 121	2116	1189	56.27	24	2.0	19.7	19	46	53.1	14.50	2.61	.86	H	H	H	43
C-187-Hicks	2343	1349	57.94	27	3.2	21.3	21	47	52.5	18.35	2.57	.81	H	M	L	61
Bell 16	2070	1205	58.42	35	1.5	19.1	19	48	48.0	15.30	2.58	.88	M	M	M	63
Speight 31	2151	1324	61.41	44	4.3	21.3	21	49	50.9	16.84	2.34	.94	M	L	L	40
McNair H-2	2175	1356	62.35	48	2.7	20.7	20	52	50.6	15.83	2.82	.74	S	S	M	50
Coker 316	2393	1444	60.64	33	3.8	19.2	22	51	54.6	16.59	1.79	1.15	H	H	L	57
Coker 128	2119	1290	60.83	41	1.4	22.0	22	52	51.3	16.86	2.53	.86	M	L	S	47
NC 75	2332	1399	59.94	42	.6	15.3	19	49	51.2	16.51	2.23	.94	M	L	M	45
Va. 12	2249	1337	59.61	40	.8	16.2	19	51	49.2	17.92	2.76	.77	S	S	S	43
McNair 10	2228	1378	61.93	47	1.6	16.2	20	51	51.9	19.14	3.16	.69	M	L	S	43
McNair 12	2291	1459	63.79	47	1.0	18.7	20	44	51.0	19.72	2.23	.97	M	H	S	42
Reams 51	2358	1433	60.73	38	2.1	17.4	22	56	56.2	16.84	2.22	.92	M	M	L	51
Bissette 11	2558	1406	55.39	26	.9	9.5	33	67	69.7	13.87	1.73	1.11	S	S	S	64
Promising breeding line under consideration for release																
NC 8069-5	2389	1461	61.41	43	1.2	17.6	21	46	52.8	17.14	2.55	.82	H	M	H	39

1/ Value based on 3 yr. ave. all belts 1958-59-60 auction price on govt. grade basis. 1960 prices through September 29

2/ Disease resistance - a relative rating based on 1960 data plus information from other disease tests. H = High resistance; M = Moderate; L = Low resistance; S = Susceptible (not resistant).

3/ Brown spot rating based on percent of leaf area damaged on 5 leaves on top third of plant. O = no damage; 100 = entire leaf area damaged. Available varieties are susceptible to brown spot. The degree of damage may vary between varieties.

6. North Carolina State College needs to supply as much up-to-date answers and information as possible through its basic and applied research. This information needs to be passed on by the Extension and teaching program to the farmers, to all segments of the tobacco industry, and to the people in general.

7. The tobacco farmers need to utilize the proven production and marketing practices to produce the most desirable quality as efficiently and economically as possible. He needs to have pride in the quality and appearance of his tobacco. Also, proper appreciation for the satisfaction the consumer will get from the use of his tobacco. This calls for selecting proven varieties, cultural practices, chemicals, curing and marketing practices that will produce a product that will provide the maximum satisfaction in the domestic and foreign trade. A sound, healthy growing industry cannot be built on "what we can get by with" at the farm, market or in the processing plant.

BRIEF DESCRIPTION OF NEW VARIETIES

McNair 10 - (developed from a cross of DB 101 x DB 102)0x 1-181) produced a medium high yield of tobacco that rated generally as acceptable in quality by tobacco companies. It was medium tall, with a medium high leaf count and medium low number of suckers. It had medium narrow and pointed leaves of medium length. The cured tobacco had medium to fairly heavy body with a relatively desirable color. The percent reducing sugar and nicotine and total alkaloid were high, with a low nitrogen to nicotine ratio. McNair 10 is rated as having moderate resistance to Black Shank, low resistance to Granville Wilt, susceptible to Fusarium Wilt with a low loss from brown spot.

McNair 12 - (developed from a cross of McNair 121 x Coker 139) produced a medium high yield of tobacco rated generally as acceptable in quality by tobacco companies. The plant was low in height with a medium leaf count and a medium number of suckers. It had medium width leaves of medium length. The cured tobacco was medium in body with relatively light color. The percent reducing sugar was medium high, nicotine and total alkaloid was medium with a medium nitrogen to nicotine ratio. McNair 12 is rated as having moderate resistance to black shank, high resistance to Granville wilt, susceptible to Fusarium wilt and a low loss from brown spot.

NC 75 - (developed from a cross of DB 102 x Bottom Special)Bel 1-76) produced a high yield of tobacco rated as generally acceptable in quality by tobacco companies. It was medium in height with a medium number of leaves and low ground sucker count and medium low number of leaf axil suckers. It had broad leaves in the lower part of the plant, medium narrow leaves toward the top of the plant, and medium long leaves of medium to

thin body. The lower leaves have some brittleness especially under conditions favorable for very rapid growth. The cured leaf showed some cherry red and some tendency for a greenish tinge in the butts of leaves. The percent reducing sugar, nicotine and total alkaloid was medium with a medium nitrogen to nicotine ratio. NC 75 is rated as having moderate resistance to black shank, low resistance to Granville wilt, moderate resistance to Fusarium wilt and a moderately low loss from brown spot. There is some indication that this variety is more adversely affected by excess fertilizer than some other varieties.

Bissette 11 - (is reported as a selection out of a cross of Golden Gem 711 x Bissette Special) produced a high yield of tobacco rated as poor in quality by tobacco companies. It is a mammoth type in that it was very tall, bloomed very late, and had a very high leaf number and a low number of suckers. It had narrow, pointed, long leaves of thin body. The percent reducing sugar, nicotine and total alkaloid was moderately low with a high nitrogen to nicotine ratio. Bissette 11 is susceptible to black shank and Granville wilt and suffered heavy loss from brown spot.

Following is a promising breeding line under consideration for release:

NC 8069-5 - (developed from a cross of Coker 139 x Bel 4-30 (a nematode resistant line) x Coker 139) x Hicks) produced a high yield of tobacco that rated generally as acceptable in quality by tobacco companies. It was medium in height with a high leaf number and a medium number of suckers. It had leaves of medium width and medium length that tend to wrinkle or pucker along the veins or midrib. The lower leaves have some brittleness especially under conditions of very favorable growth. The percent reducing sugar, nicotine, and total alkaloid was medium with a low nitrogen to nicotine ratio. NC 8069-5 is rated as having high resistance to black shank, moderate resistance to Granville wilt, high resistance to Fusarium wilt, high resistance to one species of root knot nematode (M.incognitia), with a low loss to brown spot. There is some indication that this variety is more adversely affected by excess fertilizer than some other varieties.

FLUE-CURED TOBACCO SITUATION

1. PRODUCTION, ACRES, YIELD, PRICE: 1960 (est.)

	Acres	Prod. Mil. Lbs.	Yield/A	Price/Lb.
N. C.	463,000	825.9	1786	60.5
U.S.	699,000	1,235	1768	60.0
		1959		
N. C.	461,000	705.4	1530	57.9
U.S.	696,300	1,079	1550	58.3

PREVIOUS HIGH

	Acres	Prod. Mil. Lbs.	Yield/A	Price/Lb.
N. C.	843,000(1939)	978.8(1955)	1718(1958)	58.0(1958)
U. S.	1,275,000(1939)	1,483.0(1955)	1691(1958)	58.3(1959)

2. STOCKS:

(a) Total supply (carry-over plus estimated production in 1960) is estimated at 3,341 million lbs., an increase of 50 million lbs. from last year. This is 2.7 times expected disappearance. A desired level of supply is about 2.5 times the normal disappearance.

(b) At the end of the 1960 marketing season it is estimated that the Flue-Cured Stabilization Corporation will have 545 million lbs. on hand. This is 16 million lbs. less that last year.

3. DISAPPEARANCE:

Domestic consumption of flue-cured tobacco during the market year ending June 30, 1960 was approximately 766 million pounds, 4% above the past 2 years. Cigarette output in the past year was 9% above the average of the two preceding years. The use of leaf tobacco has not kept pace with the cigarette output. Cigarette consumption and to some extent the use of leaf tobacco, is expected to increase some in the year ahead.

4. EXPORT:

Exports of flue-cured tobacco during the marketing year ending June 30, 1960 totaled about 419 million pounds farm weight. This was a decline of 5% from 1958 and the smallest since 1952-53. Exports are expected to increase moderately in the year ahead because of stabilized prices, more adequate supplies, increased consumption and generally lower stocks abroad.

5. WORLD AND U. S. PRODUCTION OF FLUE-CURED TOBACCO:

	Million Lbs.				
	1947-51	1956	1957	1958	1959
Foreign Production	793	1648	1737	1830	1821
U. S. Production	1246	1422	975	1081	1079
U. S. Percent of Total	61.1	46.3	36.0	37.1	37.2

6. EXPORTS OF FLUE-CURED TOBACCO WORLD AND U. S.:

Foreign Export	144	392	346	370	405
U. S. Export	388	420	418	399	374
U. S. Percent of Total	73	52	55	52	48

RESULTS OF 48 FERTILIZER RATE DEMONSTRATIONS 1959-60

Treatment:	Yield/A	Value/A	Price Per Lb.
1. 10 lbs. N less than recommended rate	1732	1066	61.5
2. Recommended rate based on soil test and depth of topsoil	1782	1085	60.9
3. 10 lbs. N more than recommended rate	1848	1109	60.0
4. 20 lbs. N more than recommended rate	1854	1096	59.1

The recommended fertilizer rate was based on soil analysis and the depth of the topsoil to the clay. The deeper and coarser the topsoil the more nitrogen is needed as compared to the more shallow soils. The recommended rates of nitrogen varied from 24 pounds per acre to 65 pounds. Nitrogen was the only nutrient that varied within a demonstration. Other nutrients were kept constant.

There was some variation in response to nitrogen from one farm to another (just as farmer's experience). As the nitrogen was increased up to 10 lbs. above recommendation, the yield increased some, but the quality decreased. When yield, quality and price per pound were considered, the recommended rate of nitrogen was very close to the optimum and practical level. By adjusting for leaching rains further refinement should be possible in tailoring recommendations to individual fields.

SPACING AND HEIGHT OF TOPPING TEST - Oxford 1960

(120,000 leaves per acre)

Leaves per plant	Plants per acre	Yield per acre 3.5 ft. rows	4.0 ft. rows	4.5 ft. rows
12	10,000	1886	1954	1814
15	8,000	1867	1866	1796
18	6,667	1934	1937	1847
21	5,714	1894	1916	1803

These date indicate that, height of topping, hill spacing and number of plants per acre (within reasonable ranges) had very little affect on yield as long as the number of leaves per acre was kept constant. There was no apparent difference between 3.5 and 4 foot rows but there was a reduction in yield and value with 4.5 foot rows.

The height of topping, and to a lesser degree the spacing, had some affect on the size of leaves, but as long as the leaf number per acre was constant there was little affect on the desirability of the tobacco based on company evaluation.

Considering yield and company evaluation of the tobacco, using 3.5 to 4 foot rows with 5500 to 7500 plants per acre topped 16 to 20 leaves high, seems to be within the desirable and practical limits.

Variety - Coker 316. Fertilizer - 1250 lbs. 4-8-12 per acre.

VAPORIZED METHYL BROMIDE FOR WEED AND DISEASE CONTROL IN TOBACCO PLANT BED SOILS

Time plastic cover left on bed: Results of 12 tests on tobacco farms 1960 - used 9 lbs. methyl bromide per 100 sq. yds.

Hrs. Plastic on Bed	Weeds per Sq. Ft.	Plants Per Sq. Ft.
3	17.8	31.5
6	5.1	29.7
9	4.9	35.8

Amount of MB Used: Results of 14 tests, Spring 1960 - cover left on bed 6 hours.

Lbs. Methyl Bromide per 100 sq. yds.	Weeds per Sq. Ft.	Plants per Sq. Ft.
7	12.9	24.9
8	3.8	24.8
9	4.2	24.1

Methyl bromide may be applied in the vapor form and the plastic cover can be removed from the bed in about 6 hours. This compares with 24 to 48 hours with the conventional system. A given yardage of plant bed soil can be treated in a shorter time. Less cover is needed and more yardage can be treated when the temperature and soil moisture is right than with the conventional system.

Results of Tests:

Results indicate that 8 lbs. of vaporized methyl bromide generally gave as good weed control as 9 lbs. The 7 lb. rate was inferior in many cases. The 9 lb. rate may justify the extra cost, as 8 lbs. is close to the minimum rate required. This would be especially true with dark or heavy stiff soils, or less favorable moisture and temperature at time of application.

Methyl bromide may be vaporized by puncturing the upper part of the can with the applicator while the can is held in the upright position and submerging it in hot water (start with water that is 180 degrees F. to boiling).

RESULTS OF IRRIGATION EXPERIMENTS 1959-1960

TREATMENTS			1959 ANALYSIS					
Moisture When Irrig.	Depth Wet	Water per Appl.	Yield/A	Value/A	Price/lb.	% Sugar	% Nic.	Spec. Vol.
1. 0	0	0	1820	1109	60.9	14.12	3.68	1.10
2. 5%	10"	1.2"	1916	1153	60.2	15.74	3.24	1.10
3. 20%	10"	1.0"	2043	1256	61.5	19.12	2.83	1.02
4. 40%	10"	.8"	2050	1282	62.5	17.39	2.75	1.09
5. 20%	5"	.5"	2019	1263	62.5	16.80	3.02	1.05

In these and similar tests, there have been only very small differences in yield and acre value between plots 2, 3, 4, and 5. Plot #2 is frequently one of the better treatments but in 1960 fairly heavy rains followed both irrigations.

The higher price per pound in the heavier irrigated plots is due principally to the lighter color and thinner leaf. Some of this was LL tobacco. The grade does not always reflect those tobaccos that are too light in color. The lower nicotine and pale tobacco, especially in plot 4, indicates the adverse affect of over-irrigation.

It is felt that irrigation of tobacco should be used to save the crop to get a better and uniform stand, to keep it from scalding and firing during dry periods and to keep it from going backwards. It is not desirable to force the crop excessively throughout the season for maximum yield at the expense of quality. A little dry weather, especially early in the growing season, may actually help the crop rather than hurt it. Only a moderate amount of water is desirable during the harvest period if the crop has been properly fertilized.

BULK CURING

It has been established that tobacco can be cured by clamping the equivalent of 10 to 12 normal sticks of tobacco in a frame. The leaves are held in position with spikes rather than strung on sticks. Heated air is forced up around the leaves by the use of a fan rather than depending on the natural upward movement of heated air as in the conventional system.

This system, referred to as bulk curing, shows promise as a means of saving labor principally because the leaves are not strung on a stick. However, the investment and overhead is much more than with the conventional barn based on present prices.

Much additional information is needed on the acceptability of bulk cured tobacco, the amount and cost of labor saved, cost of buying and operating a bulk curing system, most efficient system of filling frames, and storing and ordering the tobacco.

CHEMICAL SUCKER CONTROL

It will be some time before analysis data will be available from the 1960 crop, from tobacco companies and from the chemical laboratory at State College. When the results of the 1960 sucker control work is completed it will be available to tobacco growers through their County Agricultural Agent.

Growers are well aware of the apparent lack of any attempt on the part of buyers to identify or discriminate against tobacco that had been treated with MH-30 on the 1960 market. On the other hand it must be recognized that tobacco treated with MH-30 frequently cannot be separated visually from untreated tobacco during the sales.

Farmer experience and experimental data collected to date continues to show that late application and reducted rates of MH-30 do not affect the yield, physical and chemical characteristics as much as the early and heavy application of MH-30.

TOBACCO DISEASE CONTROL PRACTICES FOR 1961

Prepared by Furney A. Todd, Extension Plant Pathologist (Tobacco)

Tobacco disease losses decreased in 1960. According to estimates, tobacco diseases reduced the value of the 1960 crop by 4.1 per cent as compared to 8.29 per cent for 1959. This reduction was brought about mainly by a decrease in loss to leaf spot diseases, particularly brown spot. Loss from this disease was 5.2 per cent in 1959 and only 1.5 per cent in 1960. Nematodes and plant bed diseases were less severe in 1960 than in 1959, but loss from black shank increased slightly.

The fight against tobacco diseases is a continuous one. Many of the organisms which cause disease can live in the soil for years even in the absence of tobacco. Others can live in tobacco crop residues and still others can be blown by the wind for many miles. The best way to control tobacco diseases is to plan and follow a complete control program. If each grower would plan such a program, losses to diseases could be cut by more than 50 per cent in 1961. The following information may be of some help in planning a complete disease control program on your farm.

DISEASE CONTROL IN THE PLANT BED

Black shank and nematodes. Methyl bromide is the only treatment that gives excellent control of both nematodes and black shank. This is most important where susceptible varieties are used since black shank resistant varieties will control this disease in the plant bed.

The drench treatments of allyl alcohol plus EDB and allyl alcohol plus DD will give practical nematode control if applied correctly. For best results with drench treatments, prepare the bed thoroughly and use enough water to saturate the upper 3 to 4 inches of soil. Cyanamid alone does not control either nematodes or black shank in the plant bed.

Plant bed treatments sold under the trade names of Vapam and VPM appeared on the market a few years ago. Both materials have given good nematode control when applied as a drench. However, injury to plants sometimes was observed. Recent tests indicate that (1) if the rate is reduced (1 gal. per 100 sq. yds.), (2) if the amount of water used is reduced to about 50 gals. per 100 sq. yds. or just enough to wet the surface soil, and (3) if the bed is covered with a plastic cover for 24 hours after treatment, satisfactory results may be expected in terms of plant production and disease control. If this treatment is used, it should be tried only on a small part of the plant bed yardage.

Blue mold, anthracnose and damping-off. These diseases remain a threat to plant production although losses from blue mold and anthracnose were very light in 1960. Damping-off, however, caused considerable damage in some areas. All 3 diseases are prevented by the use of the same materials. Any of the fungicides containing ferbam, zineb or maneb applied as spray or dust give satisfactory control. Start treating when the plants are the size of a dime; put on 2 applications each week and continue through transplanting. Also, selection of a suitable site and good bed management make it easier to control these diseases. Remember, just because these diseases caused little damage in 1960 does not mean that they have disappeared. They are still with us. Plan to follow a complete fungicidal control program in 1961.

DISEASE CONTROL IN THE FIELD

Black shank. The use of disease resistant varieties plus crop rotation form the most effective program for control of black shank. All crops except tobacco are resistant to the fungus that causes black shank. Therefore, the rotation of tobacco with any crop that is grown on the farm will tend to reduce the level of this disease. Do not depend on rotation alone to take care of this disease problem.

Much thought should be given to selecting the black shank resistant variety. On farms where the level of black shank is high and no rotation is used, only varieties with high resistance should be planted. Moderately resistant varieties may be used on a farm where the disease level is not high or on farms where crop rotation is practiced. Use varieties with low resistance with caution. They have a place on farms where a long rotation is used and also where no black shank problem has been observed in past years.

Granville wilt. Losses from Granville wilt can be reduced by the use of resistant varieties and crop rotation. The rotation of tobacco with other crops that are resistant to the Granville wilt bacterium can be expected to reduce the disease. Only a few crops are resistant; therefore, crops for use in tobacco rotations in fields where wilt is present must be selected with care. Avoid the use of such crops as peanuts and weeds--especially ragweed and most vegetable crops. For best wilt control, allow 2 to 3 crops between crops of tobacco.

Crops such as corn, redtop grass and soybeans are considered excellent in reducing the severity of Granville wilt; crabgrass and Rowan lespedeza are good; and cotton, milo and sweet potatoes are fair.

Several Granville wilt resistant varieties are available. The level of resistance in these varieties ranges from low to high. If Granville wilt is a critical problem, use only varieties with high resistance. Varieties with

moderate to low resistance should perform well on farms where a long rotation is practiced.

Fusarium wilt. Fusarium wilt is controlled by the use of resistant varieties and by practices that tend to reduce the root-knot nematode; therefore, in addition to use of resistant varieties, follow a rotation for nematode control plus the use of a soil fumigant in fields where nematodes are a problem.

On many farms, more than one of these diseases (black shank, Granville wilt and Fusarium wilt) occur in the same field. Therefore, the grower must consider the disease problem present in a field before selecting the variety to be used. In fact, it would be wise to consider two points in selecting a variety: (1) which diseases are present on the farm, and (2) what is the level of infestation of the disease that is to be controlled by a resistant variety. The level of resistance of varieties to all three diseases is summarized in the following table:

INFORMATION ON RESISTANT VARIETIES - 1960

Variety	Black Shank		Granville Wilt		Fusarium Wilt		Brown Spot
	Per Cent Diseased	Level of 1/ Resistance	Per Cent Diseased	Level of Resistance	Per Cent Diseased	Level of Resistance	Disease 2/ Index
Coker 187	5	High	15	High	39	Low	61
Coker 187-Hicks	7	High	16	Mod.	47	Low	61
Coker 316	8	High	4	High	59	Low	57
McNair 121	9	High	9	High	13	High	43
Bell 16	14	Mod.	18	Mod.	14	Mod.	63
Speight 31	18	Mod.	13	Low	46	Low	40
Coker 128	18	Mod.	34	Low	75	Susc.	47
N. C. 75	4	Mod.	24	Low	21	Mod.	45
N. C. 73*	-	High	-	Susc.	-	Mod.	
Coker 156*	-	High	-	Susc.	-	Susc.	
S. C. 58*	-	High	-	Susc.	-	Susc.	
Vesta 5	18	Mod.	63	Susc.	67	Susc.	48
Ocford 1-181*	-	Mod.	-	Susc.	-	Susc.	
Reams 51	9	Mod. 3/	11	Mod.	54	Low	51
McNair 10	16	Mod.	36	Low	87	Susc.	43
McNair 12	12	Mod.	8	High	79	Susc.	42
Bell 15*	-	Susc.	-	Susc.	-	Low	
Hicks	92	Susc.	80	Susc.	50	Low	48
McNair H-2	91	Susc.	63	Susc.	19	Mod.	50
N. C. 8069-5	3	High	19	Mod.	4	High	39

* "Level of resistance" rating based on 1958-59 data.

1/ A relative rating based on 1960 data plus information from other disease tests.

2/ Index computed from % of leaf area damaged on 5 leaves from top third of plant. 0 = no damage; 100 = entire leaf area damaged. All varieties now available are susceptible to brown spot. However, they differ in the amount of damage they suffer from the disease.

3/ Reams 51 was susceptible in 1959.

Nematodes. Diseases caused by nematodes still represent a production hazard in growing flue-cured tobacco. Control of these eel-like worms is complicated because 3 types are important parasites of tobacco--root knot, meadow and stunt--consisting of 10 or 11 species. The most important from the standpoint of crop loss is the root knot nematode. That is the one which causes galls or swellings on the roots. Second in importance is the meadow nematode.

A nematode control program should consist of 2 or 3 practices on every farm. Where the population is low, the use of winter management practices and crop rotation should take care of the problem; where the population is high, a soil fumigant should also be used. A complete nematode control program would involve the use of crop rotation and certain winter management practices, also soil fumigation where the problem is critical.

1) Crop rotation. The rotation of tobacco with nematode-resistant crops long has been recognized as one of the best and most practical methods of control. Rotation can increase the value per acre by as much as $200 as compared with continuous tobacco culture. In planning a rotation, use only crops that are resistant to one or more of the 3 types of nematodes which attack tobacco. Select a crop that will reduce the particular nematode problem that is causing most damage at the present time. These alternate crops should be changed from time to time--rotate the rotation--in order to prevent the build-up of other types of nematodes. The following table contains information on the relative value of certain crops in reducing the 3 types of nematodes that attack tobacco:

Relative Value of Certain Crops in Reducing
Root Knot, Meadow and Stunt Nematodes

Crops	Root Knot	Meadow	Stunt
Small grain-weeds	Good	Good	Good
Weeds	Good	Excellent	Excellent
Fescue	Excellent	Excellent	Good
Peanuts*	Excellent	Good	Good
Cotton	Fair	Fair	Good
Corn	Good	Poor	Poor
Milo	Good	Poor	Poor
Sudan grass	Good	Poor	Poor
Sweet potatoes	Poor	Excellent	Fair
Watermelons	Poor	Excellent	-
Rowan lespedeza	Excellent	Good	Fair
Crotalaria	Excellent	Good	Excellent

* Poor in peanut belt.

The length of rotation is important. Best results are obtained with a long rotation, 2 to 3 years between crops of tobacco. However, adequate control can be expected with a 2-year rotation (one alternate crop between crops of tobacco). Control with a 2-year rotation is slow, requiring as many as 8 years or 4 complete cycles to reduce a high population to the point that fumigation would not be necessary.

2) Winter management practices. Certain winter management practices are highly effective in reducing the nematode populations. For example, plowing out tobacco stubbles immediately after harvest may reduce nematode populations as much as 75 to 90 per cent. Use of this practice alone will not give adequate nematode control but supplements control obtained with crop rotation and soil fumigation.

3) Soil fumigation. The use of chemical soil fumigants gives immediate nematode control. For best results do a thorough job of preparing the land, apply the fumigant deep--14 inches from the top of the bed or 8-10" from the soil line--and provide a seal immediately following application with a high, wide bed in case of row treatment or dragging the field to firm the soil in case of broadcast treatment. Allow at least a 2-week waiting period before transplanting. If heavy rains follow soon after application, open the bed for aeration.

The following table contains the suggested rates and the relative value of the different fumigants for control of the 3 types of nematodes that attack tobacco:

Summary

Results of Soil Fumigation Tests, 1960

Fumigant	Gals. Per Acre		Control of:		
	Row	Broadcast	Root Knot	Meadow	Stunt
D-D, Vidden D & others (dichloropropene-dichloropropane)	10	20	Excellent	Good	Good
Telone (dichloropropene)	8	16	Excellent	Good	Good
EDB-85 (ethylene dibromide)	2 1/2	4 1/2	Excellent	Poor	Excellent
Dorlone, & others (dichloropropene plus ethylene dibromide)	6	12	Good	Good	Good
Fieldfume, Terra Fume-2 (dichloropropene-dichloropropane plus ethylene dibromide)	6	12	Good	Good	Good

Brown spot. This disease cost flue-cured growers over $9,000,000 in 1960. In 1959, it cost growers over $21,000,000. During both 1959 and 1960, brown spot was considered the Number One disease problem of flue-cured tobacco in terms of damage caused.

Brown spot is caused by a fungus that is generally regarded as a weak parasite; however, this weak parasite may severely damage the leaves of plants that are low in vigor. Consequently, any factor that tends to weaken the plant usually results in increased damage from the brown spot disease. For example, a severe nematode attack or damage caused by excess water may increase the susceptibility of tobacco plants to brown spot. Over-fertilization with nitrogen also tends to increase the amount of brown spot.

The fungus that causes this disease produces enormous numbers of spores or microscopic seed-like bodies during periods of wet weather. These spores are spread by the wind and water. Infection occurs most readily when the leaves are wet. The disease causes most damage on mature leaves. Consequently, it occurs most commonly during the harvest period.

Information was obtained on the development of brown spot in different varieties of tobacco this past season. No variety has resistance but differences were found with regards to damage caused by the brown spot fungus.

Mosaic. Mosaic is one of our oldest known tobacco diseases. It is caused by a highly contagious virus that is spread by contact. Losses to this disease vary to some extent between seasons but little progress has been made in reducing losses during the last 25 years. In 1958, 1959 and 1960 considerable research has been done on the use of milk for control of tobacco mosaic. It has been found that the use of milk in any form at transplanting time will greatly reduce losses. Two types of treatment have been used: (1) Spraying plant bed within 24 hours before pulling the plants with 5 gals. of whole or skim milk or 5 lbs. of dried skim milk mixed with 5 gals of water, applied to a 100 sq. yd. bed. (2) Dipping the hands, during plant pulling and transplanting to the field, about every 20 mins. in whole or skim milk or a mixture of 1 lb. of dried skim milk to 1 gal. of water.

The following table contains information on mosaic control with milk. This information was obtained from tests in which the hands of all workers were contaminated with the mosaic virus. No milk was used on the check treatment.

Control of Tobacco Mosaic with Milk-1960

Treatment	Per Cent Mosaic					
	Whiteville	Clayton	Greenville	Oxford	Rural Hall	AVERAGE
Check	97	68	91	85	85	85
Dip	15	5	21	32	24	19
Spray	38	15	45	62	32	38
Spray + Dip	3	1	6	8	23	8

Tobacco from the test conducted in 1959 was harvested for yield and quality. The yield as shown in the following table was low in the check plot as a result of the high per cent of plants affected with mosaic. Quality of the mosaic infected tobacco in the check plot, as indicated by the price per 100 lb., was lower than the other treatments.

Control of Tobacco Mosaic with Milk - Yield and Value, Whiteville, 1959

Milk Treatment	Per Cent Mosaic	Avg. Yield Lbs./Acre	Avg. Value $/Acre	Price Per CWT. $
Check	85	1434	906	63
Spray	17	1830	1229	67
Dip	6	2016	1367	68
Spray + Dip	3	2114	1437	68

The following publications contain more detailed information on tobacco diseases and methods of control. They will be of help in planning a complete tobacco disease control program. All of these publications are available through your county agent's office.

TOBACCO BLUE MOLD AND ANTHRACNOSE CONTROL, Ext. Cir. 397
TREATMENT OF TOBACCO PLANT BED SOILS WITH METHYL BROMIDE, Exp. Sta. Bul. 399
CROPPING SYSTEMS FOR NEMATODE CONTROL & TOBACCO PRODUCTION, Ext. Cir. 409
FALL CULTURAL PRACTICES FOR NEMATODE CONTROL IN TOBACCO, Ext. Folder 154
SOIL FUMIGATION FOR NEMATODE CONTROL IN TOBACCO, Ext. Cir. 402
MOSAIC CONTROL IN TOBACCO, Ext. Folder 128
BROWN SPOT CONTROL IN TOBACCO, Ext. Folder 139
SORE SHIN AND SOUTHERN STEM ROT OF TOBACCO, Ext. Folder 140
CONTROL TOBACCO BLACK SHANK, Ext. Folder 161
PLANNING A NEMATODE CONTROL PROGRAM FOR FLUE CURED TOBACCO, Plant Pathology Information Note.

Published by The North Carolina Agricultural Extension Service

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING OF THE UNIVERSITY OF NORTH CAROLINA AND THE U. S. DEPARTMENT OF AGRICULTURE, COOPERATING. N. C. AGRICULTURAL EXTENSION SERVICE, D. S. WEAVER, DIRECTOR. STATE COLLEGE STATION, RALEIGH. DISTRIBUTED IN FURTHERANCE OF THE ACTS OF CONGRESS OF MAY 8 AND JUNE 30, 1914.

DECEMBER 1960

Prepared By Roy R. Bennett & S.N. Hawks