

ANNUAL REPORT

1944 - 1945

SOIL AND WATER CONSERVATION RESEARCH

(Bankhead-Jones Fund)

Agricultural Engineering Department
Virginia Agricultural Experiment Station
Blacksburg, Virginia

In Cooperation With

Research Division, Soil Conservation Service
U. S. Department of Agriculture

July 1, 1945

SOIL AND WATER CONSERVATION RESEARCH

1944 - 1945

1. Personnel:

Administration:

Virginia Agricultural Experiment Station

C. E. Seitz, Head of Department of Agricultural Engineering (Part Time)

T. W. Edminster, Assistant Agricultural Engineer
July 1, 1943 - August 31, 1944

Soil Conservation Service

George A. Crabb, Jr., Agricultural Engineer
April 1943 - August 1944

T. W. Edminster, Agricultural Engineer
September 1, 1944 ----

Assistants:

Virginia Agricultural Experiment Station:

Mrs. Elizabeth Minné, Laboratory Technician
January 1945 ----

Phyllis Howard, Clerk-Stenographer
August 1944 ----

Louise Howard, Clerk-Stenographer
October 1944 ----

Soil Conservation Service:

Bonnie J. Fillingane, Clerk-Stenographer
September 1943 ----

J. R. Price, Agricultural Aid
April 1943 ----

Miscellaneous hourly labor:

In addition to the above, several additional laboratory assistants, computers and field assistants have been employed from time to time.

Personnel Changes:

On August 23, 1945 Mr. George A. Crabb, Jr., Project Supervisor for the Soil Conservation Service went on military furlough to accept a Navy commission. T. W. Edminster,

Assistant Agricultural Engineer, resigned from the Virginia Agricultural Experiment Station staff on August 31, 1944 and assumed the duties of Project Supervisor for the Soil Conservation Service. And, in the absence of Experiment Station personnel, he has assumed responsibility for the administration, maintenance, and continuation of all Experiment Station work in addition to his regular duties as an Soil Conservation Service employee.

Two full time clerks have been added to the staff to assist in the tabulation, computation, and typing of the research data that had been allowed to accumulate in past years. A full time laboratory technician is employed in carrying out routine chemical and physical soils studies.

2. Progress and Results of Research:

A. Soil and Water Losses From Crop Land:

Operation of the system of run-off plots to study the effects of slope, character of soil, rainfall, and cropping treatments on erosion losses was continued.

The year 1944 showed relatively light soil and water losses. With the exception of several minor periods of erosion the majority of the losses were confined to storms occurring February 17, May 24, and June 23. The storm of May 24, with a total of 2.66" falling in two hours 53 minutes and having an intensity of 2.36" for a 15 minute interval, caused large soil losses throughout the Blacksburg area.

The following tables (I and II) summarize the soil and water losses from each of the plots during 1944. These same data are compared to the results in 1943 and to the eight year plot averages.

Tables III, IV, and V summarize the 1944 crop yields of corn, wheat, and clover from the control plots. Table VI compares the 1944 yields with the averages of the previous years records.

Despite the absence of the regular Soil Technologist, testing work has been carried on in the Soils Laboratory. Total calcium and magnesium determinations have been made on all eroded material samples collected since 1941.

An additional storage and machinery shed was constructed at the rear of the reservoir house on the control plot area. The

SLOPE	CROP	1 9 4 3	1 9 4 4*	8 Year Avg.
5	Corn	23.73 Tons	0.30 Tons	5.08 Tons
	Wheat	0.43 "	1.26 "	0.60 "
	Clover	0.07 "	0.03 "	0.02 "
10	Corn	54.63 Tons	0.40 Tons	10.61 Tons
	Wheat	0.46 "	2.50 "	1.59 "
	Clover	0.06 "	0.06 "	0.06 "
15	Corn	71.98 Tons	2.32 Tons	15.96 Tons
	Wheat	0.51 "	1.77 "	0.96 "
	Clover	0.06 "	0.02 "	0.02 "
20	Corn	75.12 Tons	5.17 Tons	16.57 Tons
	Wheat	0.14 "	1.69 "	0.54 Tons
	Clover	0.15 "	0.00 "	0.03 "
25	Corn	94.86 Tons	4.95 Tons	22.19 Tons
	Wheat	0.17 "	1.58 "	0.87 "
	Clover	0.07 "	0.00 "	0.01 "

*Preliminary

TABLE I - SUMMARY OF SOIL LOSSES ON BASIS OF ANNUAL YEAR

JANUARY 1 - DECEMBER 31, 1944

BLACKSBURG, VIRGINIA

SLOPE	CROP	1 9 4 3	1 9 4 4*	8 Year Avg.
5	Corn	6.1876 Inches	.4657 Inches	1.8211 Inches
	Wheat	.3320 "	2.9886 "	.9332 "
	Clover	.5969 "	.3445 "	.1777 "
10	Corn	7.9956 Inches	2.4106 Inches	2.4106 Inches
	Wheat	1.7341 "	3.9650 "	2.8133 "
	Clover	3.9608 "	.3181 "	.9599 "
15	Corn	7.8055 Inches	.5434 Inches	2.1236 Inches
	Wheat	1.9954 "	1.3394 "	1.0425 "
	Clover	.6187 "	.5635 "	.1618 "
20	Corn	8.7245 Inches	.7523 Inches	2.4177 Inches
	Wheat	1.6368 "	3.2274 "	.9676 "
	Clover	2.8674 "	.4719 "	.4824 "
25	Corn	7.5965 Inches	.6908 Inches	2.5605 Inches
	Wheat	1.0326 "	2.2611 "	1.1122 "
	Clover	.5387 "	.4337 "	.1329 "

*Preliminary

TABLE II - SUMMARY OF WATER LOSSES ON BASIS OF ANNUAL YEAR

JANUARY 1 - DECEMBER 31, 1944

BLACKSBURG, VIRGINIA

SLOPE	LBS. SHELLLED CORN PER PLOT	LBS. SHELLLED CORN PER ACRE	BUSHELS/ACRE
5M	27.0	1350	22.5
10M	20.5	1025	17.1
15M	35.0	1750	29.2
20M	39.5	1975	32.9
25M	56.5	1825	30.4

TABLE III - CORN CROP YIELD - 1944

SLOPE	PLOT YIELD - LBS.	ACRE YIELD - LBS.	ACRE YIELD - BUSHELS
5 L	35.50	1275.0	29.58
10 L	33.75	1687.5	28.12
15 L	37.25	1862.5	31.04
20 L	29.00	1450.0	24.17
25 L	25.25	1262.5	21.04

TABLE IV - WHEAT CROP YIELD - 1944

SLOPE	GREEN WT. PER PLOT - LBS.	% DRY MATTER	WT.(AIR DRY)/ PLOT - LBS.	WT.(AIR DRY)/ACRE LBS.	TONS
5 R	127	56.08	71.22	3561.0	1.78
10 R	95	49.98	47.48	2374.0	1.19
15 R	175	47.06	81.88	4094.0	2.05
20 R	114	45.25	51.58	2579.0	1.29
25 R	101	52.01	52.53	2626.5	1.31

TABLE V - CLOVER HAY CROP YIELD - 1944

Corn

	5%	10%	15%	20%	25%
7 Yr. Avg.	51 bu./A.	42.6 bu/A	50.3 bu/A	55.9 bu/A	55.6 bu/A
1944	22.5 bu/A	17.1 bu/A	29.2 bu/A	32.9 bu/A	30.4 bu/A

Wheat

	5%	10%	15%	20%	25%
5 Yr. Avg.	20.4 bu/A	18.6 bu/A	22.6 bu/A	21.2 bu/A	20.6 bu/A
1944	29.6 bu/A	28.1 bu/A	31.0 bu/A	24.2 bu/A	21.0 bu/A

Clover

	5%	10%	15%	20%	25%
6 Yr. Avg.	2.1 T/A	2.1 T/A	2.29 T/A	2.02 T/A	2.05 T/A
1944	1.78 T/A	1.19 T/A	2.05 T/A	1.29 T/A	1.31 T/A

TABLE VI - COMPARISON OF 1944 CROP YIELDS
WITH AVERAGES OF PREVIOUS RECORDS

recording anemometer was put into service on the plot area. During May and June the installation of an automatic evaporation recording station was gotten under way.

B. Moisture Conservation and Erosion Control on Permanent Pasture:

The study of the practicality of contour furrows as an erosion control measure was continued during 1944.

Little run-off data became available due to the few high intensity storms during the 1944 season. Complete recordings of herbage yields were collected, however.

Tables VII and VIII summarize the run-off from the pasture plots during the three year period that they have been in operation. Table IX summarizes in detail the 1944 pasture plot herbage data.

During September 1944 the Soil Conservation Service Project Supervisor conducted a survey among the pasture furrow users in the state of Virginia. The results of this survey, together with results from a similar survey conducted in 1938 by R. E. Brown, Soil Conservation Service former VA-R-1 Project Supervisor, plus certain project data, were combined to form an Soil Conservation Service (In-Service) "Progress Report on Contour Pasture Furrow Investigations in Virginia".

C. Rates and Amounts of Run-off from Small Agricultural Watersheds:

Records of rainfall, run-off and cover conditions were collected throughout the year from the two watersheds in Blacksburg and from the three Piedmont watersheds located on the sub-project located at Chatham, Virginia.

Blacksburg, Virginia

Table X gives a brief summary of the precipitation, run-off, and cover records on W-II and W-III. The strip cropping now practiced on these watersheds once again completely controlled all siltation and soil loss formerly noted in the watershed channels. Table XI gives yearly summaries of the precipitation and run-off from these same watersheds. Table XII summarizes the number of high intensity storms occurring during the experimental period. This same table itemizes the cover conditions for each year.

Treatments	1942				1943				1944			
	No. Rains	Total Rain-fall	In. of Run-off	% Run-off	No. Rains	Total Rain-fall	In. of Run-off	% Run-off	No. Rains	Total Rain-fall	In. of Run-off	% Run-off
Untreated	16	16.02	3.66	7.62	11	13.77	6.32	16.30	3	4.87	1.48	30.39
Fertilized	16	16.02	5.25	11.26	11	13.77	7.58	16.35	3	4.87	2.48	50.99
Furrowed	16	16.02	0.67	1.40	11	13.77	2.82	6.81	3	4.87	0.59	12.18
Fert&Furr.	16	16.02	0.58	1.22	11	13.77	1.66	4.01	3	4.87	0.33	6.77

TABLE VII - YEARLY RUN-OFF FROM PASTURE PLOTS

Treatment	Total No. of Rains Causing Run-off	Tot. Inches of Rainfall Causing R. O.	Total In. of Run-off	Percent of Rainfall That Ran off
Untreated	30	34.66	11.46	33.06
Fertilized	30	34.66	15.31	44.17
Furrowed	30	34.66	4.08	11.77
Fert. & Furrowed	30	34.66	2.57	7.41

TABLE VIII - THREE YEAR SUMMARY OF PASTURE PLOT RUN-OFF

Date	Block	Untreated	Fertilized	Furrowed	Fert. & Furrowed
5/23/44	1	560.1	2211.4	819.6	2878.6
	2	1488.8	1987.9	871.1	2349.5
	3	1142.2	2130.6	704.4	2134.8
	Sum.	3191.1	6329.9	2395.1	7362.9
	Average	1063.7	2110.0	798.4	2454.3
7/11/44	1	748.0	1000.6	591.7	596.9
	2	697.4	987.3	608.3	767.4
	3	616.8	962.1	354.6	571.5
	Sum.	2062.2	2850.0	1554.6	1935.8
	Average	687.4	950.0	518.2	645.3
11/7/44	1	698.0	798.2	373.8	648.4
	2	217.2	464.1	380.0	465.9
	3	256.2	813.8	282.2	607.7
	Sum.	1171.4	2076.1	1036.0	1722.0
	Average	390.5	692.0	345.3	574.0
Total		6424.7	11256.0	4985.7	11020.7
Average		2144.6	3752.0	1661.9	3673.6

	Fertilized	Unfertilized	Furrowed	Unfurrowed
	3752.0	2144.6	1661.9	2144.6
	3673.6	1661.9	3673.6	3752.0
Sum.	7425.6	3806.5	5335.5	5896.6
Average	3712.8	1903.2	2667.8	2948.3

Difference + 1809.6 #

Difference - 280.5

TABLE IX - SUMMARY OF PASTURE PLOT HERBAGE YIELDS FOR 1944

	W-II	W-III
Total Precipitation	34.68	34.68
Total Run-off	.5048	.3102
Per cent Run-off	1.46	.89
Total Number Precipitations	120	120
Total Number Run-offs	4	22
Per cent Acreage in Pastures		8.9
Woods		2.5
Corn	45.78	38.5
Wheat	29.04	23.1
Hay	25.18	27.0

TABLE X - BLACKSBURG WATERSHED DATA - 1944

TABLE XI-A - YEARLY SUMMARY OF PRECIPITATION AND RUN-OFF

WATERSHED CHARACTERISTICS:

Station: W-II Blacksburg, Virginia
 Size: 5.44 Acres 0.0085 Square Mile
 Range in Elevation: 2065 ft. to 2122 ft.
 Prevailing Land Slopes: 6%, 10%
 Range in Land Slopes: 1% to 24%
 Length of Principal Waterway: 600 ft.

Average Slope of Principal Waterway: 6%Total Number of Waterways: 1Number of Acres Per Waterway: 5.44Total Length of Waterways: 600 ft.Drainage Density (Length of Waterways Per Acre): 110 ft./AcreForm Factor A/L^2 = 0.29Area of Woods: None

SOIL CHARACTERISTICS:							
Type	Acres	% of Area	Type	Acres	% of Area	Type	% of Area
Emory S. Loam	0.3	5.5					
Dunmore S. "	5.14	94.5					

MONTH	1939		1940		1941		1942		1943		1944		1945		1946	
	Rain	Runoff	Rain	Runoff	Rain	Runoff	Rain	Runoff	Rain	Runoff	Rain	Runoff	Rain	Runoff	Rain	Runoff
January			1.19	----	1.86		1.78		2.66	0.0004	1.84		2.67	----		
February			1.93	.0058	.82		1.39		1.73	----	6.46		4.08	----		
March			2.34	.0010	1.87		2.34		3.87	----	4.19		2.25	----		
April			4.09	.0926	2.59		.57		2.67	0.0011	2.28		2.59	----		
May	1.1		6.49	.6166	.32		6.41	0.8548	4.27	0.0587	4.35	0.4539	4.52	----		
June	4.84	.5270	3.59	.2320	5.75		6.11	1.4982	6.20	0.7920	2.98	0.0509				
July	3.30	.2280	3.78	.0172	5.75		1.81	0.0045	6.81	1.4523	2.44					
August	5.49	.9995	9.69	.5744	2.39		5.34	0.1033	3.16	0.3123	.80					
September	1.53	.1505	.59	----	1.67		3.40	0.0383	1.21	----	4.96					
October	.51	.0566	2.34	----	1.41		3.24	0.0428	1.90	----	3.02					
November	1.04	----	1.80	.0065	.99		1.20	0.0096	1.31	----	2.11					
December	1.69	----	1.93	----	3.01		.94	0.0030	2.45	0.0242	1.76					
Total	19.50	1.9616	39.76	1.5461	28.43		34.53	2.5545	38.24	2.6410	37.42	0.5048				

Percent Runoff 10.06

3.89

0

7.40

6.91

1.35

TABLE XI-B - YEARLY SUMMARY OF PRECIPITATION AND RUN-OFF

WATERSHED CHARACTERISTICS:

Station: W-III Blacksburg, VirginiaSize: 19.3 A. 0.032 Square MilesRange in Elevation: 2058 ft. to 2128 ft.Prevailing Land Slopes: 3%, 5%, 13%Range in Land Slopes: 1% - 20%Length of Principal Waterway: 1,400 ft.Average Slope of Principal Waterway: 4.6%Total Number of Waterways: 1Number of Acres Per Waterway: 19.3 A.Total Length of Waterways: 1,400 ft.Drainage Density (Length of Waterways Per Acre): 73 ft./AcreForm Factor A/L^2 = 0.50Area of Woods: 0.4 A.Area of Pasture 1.5 A.

SOIL CHARACTERISTICS:							
Type	Acres	% of Area	Type	Acres	% of Area	Type	Acres
Emory S. Loam	1.20	6.2					
Dunmore S. "	17.30	89.65					
Dunmore C. "	0.80	4.15					

MONTH	1939	1940	1941	1942	1943	1944	1945	1946
	Rain	Runoff	Rain	Runoff	Rain	Runoff	Rain	Runoff
January			1.19	----	1.86	.0019	1.78	----
February			1.93	----	.82	.0013	1.39	----
March			2.34	----	1.87	.0049	2.34	----
April			4.09	.0201	2.59	----	.57	----
May	1.1		6.49	----	.32	----	6.41	0.7925
June	4.84	.3129	3.59	.0306	5.75	.0057	6.11	2.1327
July	3.30	.1597	3.78	.0015	5.75	.0131	1.81	----
August	5.49	.8543	9.69	.3228	2.39	.0012	5.34	0.0044
September	1.53	.0831	.59	.0014	1.67	.0014	3.40	0.0052
October	.51	----	2.34	.0027	1.41	----	3.24	0.0006
November	1.04	----	1.80	.0536	.99	----	1.20	----
December	1.69	----	1.93	.0005	3.01	.0012	.94	----
Total	19.50	1.4100	39.76	.4332	28.43	.0045	34.53	2.9354

Percent Runoff 7.23

1.09

0.02

8.50

4.27

0.92

0.03

Year	No.	Intensity 15 Min. Period	No.	Year
1942	3	0.50 - 0.99	7	1943
	7	1.00 - 1.49	7	
	1	1.50 - 1.99	4	
	4	2.00 - 2.49	4	
		3.00 - 3.49	2	
		5.00 -	1	

Cover Conditions

All in Corn

W-II

30.05 % Barley
37.87 % Oats
32.08 % Corn

Cover Conditions

W-III

8.9% Pasture
2.5% Woods
17.5% Barley
33.2% Oats
38.0% Corn

TABLE XII - NUMBER AND FREQUENCY OF HIGH INTENSITY
STORMS FOR 1942 AND 1943

Chatham, Virginia Sub-Station

The year 1944 contributed an excellent set of records on the three Piedmont watersheds. A number of high intensity storms throughout the year, together with a serious flood rain on September 17-18 gave excellent data.

Table XIII gives a brief summary of the 1944 precipitation, run-off and cover conditions on the three Chatham watersheds. Table XIV presents a detailed analysis of the storms and their results during the month of September. The run-off conditions shown for September 17-18 compare very closely with the conditions reported by David Cardwell (former SCS VA-R-2 Project Supervisor) in 1940.

It is hoped that within one more year a sufficient quantity of information will have been assembled to allow for the preparation of a special hydrologic report covering Virginia. Such a report was proposed by Dr. D. B. Krimgold at a conference in Washington on May 14, 1943.

D. Comparison of Various Tillage Practices Useful in Utilizing Plant Residue Mulches for Reducing Soil and Water Losses Under Cultivated Crops:

This project, initiated in March 1944, has one year of completed data. Some very interesting and significant results were obtained even after but one year's experience.

The four tillage implements under trial showed very definite effects upon corn crop yields. The disc harrow gave lowest yield, the sweep and the share type of implement gave intermediate yields while the turn plowed check areas gave top yield. These same relationships were reflected in each of the series of soil analyses that were run each month. Available nitrogen, phosphorus, potassium, calcium, and magnesium determinations all showed highest values on the plowed plots, intermediate values on the sweep and share plots, and lowest values on the disced plots. Similar relationships were noted on growth, rates of maturity, moisture distribution, and other miscellaneous quantitative measurements. Table XV summarizes the available nitrate nitrogen data from the 1944 season.

	W-I	W-II	W-III
Total Precipitation	56.29	56.53	54.93
Total Run-off	9.5562	14.1862	11.5584
Per cent Run-off	16.98	25.95	21.04
Total Number Precipitations	135	101	108
Total Number Run-offs	25	30	37
Percent Acreage in Pasture	8.3		
Woods	3.4		7.1
Corn	25.6		
Hay	16.6		3.6
Tobacco	7.1	51.4	21.7
Soy Beans	34.1		
Other	4.9	2.5	3.4
Lespedeza		12.9	57.0
Idle		33.2	

TABLE XIII - WATERSHED DATA - CHATHAM, VIRGINIA - 1944

TABLE XIV - SUMMARY OF OUTSTANDING RUN OFF PERIODS FOR WATERSHEDS W-I, W-II, AND W-III NEAR DANVILLE, VIRGINIA

FOR THE MONTH OF SEPTEMBER 1944

R A I N F A L L						R U N - O F F									
Watershed	Volume	Intensity For				Volume	Maximum Rate	Date	Inches	Coef. Per	Cover				
and	in	5M	10 M	15 M	50 M	in	CPH				and				
Date	Inches	Inches/Hour				Inches	CPH				15M Rate "C"	Tillage			
W-I 13.3 A															
9/11-9/12	2.96	3.60	3.24	2.48	1.80	.405	8.764	.659	8/26-	.06	.27	Pasture	8.27 %		
9/13 - No. 1	0.58	1.68	1.08	0.80	0.64	.033	1.383	.104	9/11-9/12	2.96	.13	Tobacco	7.07 %		
9/13 - No. 2	0.62	0.96	0.66	0.52	0.32	.170	0.389	.003	9/13	.38	.01	Leasp. Hay	10.62 %		
9/13 - No. 3	0.50	0.72	0.96	0.88	0.48	.118	0.449	.034	9/13	.62	.04	Corn	25.56 %		
9/17-9/18	7.51	4.56	2.76	2.88	2.52	5.232	27.309	2.053	9/13	.50	.71	Soy Beans	34.14 %		
9/19	2.56	2.64	1.00	1.76	1.48	1.648	9.502	.714	9/17-9/18	7.51	.40	Misc.	8.34 %		
9/20	.36	1.20	0.96	1.04	0.60	.167	0.626	.047	9/19	2.56	.04				
9/28-9/29	1.90	0.72	0.42	0.40	0.40	.142	0.435	.033	9/20-9/25	.44	.08				
9/29-9/30	1.62	1.08	0.96	0.80	0.52	.639	1.361	.102	9/28-9/29	1.90	.13				
W-II 16.06 A															
9/11-9/12	2.00	1.80	1.20	1.20	1.20	.354	5.073	.316	8/26	.06	.26	Lespedeza	12.89 %		
9/13- No. 1	1.09	.06	.84	.72	.44	.030	0.228	.014	9/11-9/12	2.00	.02	Idle	33.19 %		
9/13- No. 2	.24	.36	.30	.32	.26				9/13	1.09		Tobacco	51.43 %		
9/17-9/19	11.00	6.00	4.50	4.00	3.80	6.4478	52.400	3.263	9/13	1.09	.82	Channel Area	2.49 %		
9/20	.76	1.20	1.50	1.20	1.30	.1237	4.726	.294	9/17-9/19	11.00	.24				
9/28-9/29	2.38	.48	.48	.56	.48	.3996	0.898	.056	9/25	.10	.10				
9/30	1.41	.60	.42	.52	.52	.1872	0.715	.004	9/29	2.38	.10				
W-III 17.08 A															
9/11-9/12	1.48	2.40	1.32	1.12	1.00	.2469	2.400	.110	8/26	.07	.12	Tobacco	22.01 %		
9/13- No. 1	1.10	1.92	1.44	1.08	.76	.0539	.890	.052	9/11-9/12	1.48	.05	Mixed Hay	67.50 %		
9/13- No. 2	.66	.96	.84	.64	.36	.2844	.403	.024	9/13	1.10	.04	Channels	2.34 %		
9/17-9/19	10.59 ¹	4.56 ²	2.76 ²	2.88 ²	2.52 ²	7.2371	33.930	1.986	9/13	.66	.69	Woods	7.08 %		
9/20	.50	1.68	1.32	1.20	.88	.2227	2.141	.125	9/17-9/19	10.59 ¹	.10	Roads	1.05 %		
9/29	1.98	.96	.60	.48	.40	.2637	1.117	.065	9/25	.18	.14				
9/29-9/30	1.74	.48	.42	.40	.40	.2759	1.061	.062	9/29	1.98	.16				

¹Standard Gage Reading

²From W-I R-3 failed to give a legible record.

TABLE XV - EFFECT OF TILLAGE AND CULTIVATION TREATMENTS
UPON NITRATE NITROGEN UNDER CORN

The following data are based upon the 1944 results in the stubble mulch project at Blacksburg, Virginia. Tables A and B present the arithmetic averages for the six replicates of each treatment. Sampling consisted of ten randomized plant depth samples from each plot area, mixed, quartered and run in duplicate in the laboratory. Frappe's colorimetric method of determination was used.

Summary of Nitrate Nitrogen

Pounds/Acre

Date	Plow	Share	Disc	Sweep
April - Untilled	47.00	54.73	46.73	54.27
May - Tilled	35.13	23.60	11.60	22.80
June - Tilled & Cult.	40.73	24.88	12.40	22.66
July - Tilled & Cult.	39.84	22.00	12.60	19.40
August - Tilled & Cult.	51.56	23.89	22.51	55.03
September - Tilled & Cult.	27.73	42.98	41.80	30.95

Table A - Comparison of Tillage Implements

Date	P l o w		S h a r e		D i s c		S w e e p	
	Chisel	Sweep	Chisel	Sweep	Chisel	Sweep	Chisel	Sweep
April - Untilled								
May - Tilled								
June - Tilled & Cult.	38.07	43.40	23.77	26.00	11.13	13.67	19.60	21.73
July - Tilled & Cult.	39.27	40.40	19.60	24.40	10.93	14.27	21.33	17.47
August - Tilled & Cult.	54.53	48.60	23.00	24.77	24.43	20.60	28.40	26.63
Sept. - Tilled & Cult.	29.23	26.23	39.70	46.27	42.63	40.97	39.37	22.53

Table B - Comparison of Tillage Implements

Statistical analysis by the Virginia Agricultural Experiment Station Statistical Laboratory showed the following results:

Month	Tillage	Cultivation
April (Prior to Tillage)	No significant Difference	Not yet cultivated.
May	< 1%	-----
June	< 0.5%	No significant difference.
July	< 0.5%	
August	< 0.5%	
September	No significant difference	

*There was a significant difference of < 5% between replicates.

The following summary of statement may be made. Turn plow tillage consistently gave the highest reading of available nitrate nitrogen. The share and sweep tillage practices were relatively similar, but consistently lower than the turn plowed practice. Discoid plots consistently showed an extremely low availability.

There appeared to be no significant difference in the nitrate nitrogen level as affected by the type of cultivation tool.

These many relationships all indicated a definite time lag in plant nutrient release under stubble mulch practices. The growth curve of the corn appeared to be about two weeks ahead of the nutrient release curve. This factor has led to several additional studies of ways and means of making the two curves coincide.

During this present season a number of additional plots has been installed with various modified tillage methods. A series of controlled mulch plots has been established to determine the rates of soil temperature and moisture change under various degrees of mulching. It is hoped that the results of these additional studies will assist in the development of certain modified practices that will overcome the problems hitherto met with.

E. Study of the Effect of Cropping and Fertilizer Treatments on the Physical Properties of the Soil:

This study has been carried on by Lt. Jesse Elson in absentia. Copies of the laboratory data, compiled during previous years, have been forwarded to Lt. Elson at Hawaii for further analysis and computation by him. These data will be ready for publication upon Lt. Elson's return.

F. Study of the Environmental Adaptability and Soil Conserving Properties of Kudzu in the Blacksburg Area:

This study, having completed but one year, is not sufficiently advanced to warrant a full report. The relatively few high intensity storms during 1944 caused little soil loss on these plots.

G. Animal Husbandry Department Tillage Trial:

The project staff has cooperated with the Animal Husbandry Department in studying the effect of various new types of tillage implements upon crop yield, weed control, soil structure, and soil erodibility. The trials include the use of the Seaman Tiller and a rotary moldboard plow known as a pulverator. A turn plowed area serves as a check.

H. Fish Pond Dam Study:

At the request of the Operations Division, the Soil Conservation Service Project Supervisor has cooperated on a study of the fish pond dam failures in lower Pittsylvania County during September 1944. Mechanical capabilities of the soils in each of these dams was studied. The engineering designs

are now being checked against the hydrologic data collected by the watershed studies in that area.

I. Status of Soils Research Laboratory:

The absence of a regular Soil Technologist on the staff has greatly handicapped the laboratory work. However, in January a University of Wisconsin graduate in Medical Technology was hired on an hourly basis. Since that time much of the back analysis work has been completed. Under the present schedule of work, the bulk of back analysis should be completed by January 1, 1946.

Considerable time and effort has been put into the rearrangement, modification and construction of improved laboratory facilities to permit a more efficient use of the technician's time.

3. Publications:

Edminster, T. W., Crabb, G. A., Jr., "Losing Farms by the Truckload", State Soil Conservation Committee, Pamphlet No. 1, 1944, 4 pp.

Edminster, T. W., "A Progress Report on Contour Pasture Furrow Investigations in Virginia", Soil Conservation Service In-Service Mimeograph Report, 1944, 18 pp.

Edminster, T. W., "Bibliography of Supplementary Reading for Virginia Soil Conservation Service Technicians", SCS Mimeograph (In-Service), 1944, Vol. I, Nos. 1 and 2.

4. Accomplishments:

The results of the first year of stubble mulch research has contributed much experience and valuable information for use in advising in its application by the farmers of Virginia. The experiments have shown that the practice is uncertain under some conditions and, for that reason, should not be used indiscriminately until further studied and modified by research specialists.

5. Work To Be Completed Next Fiscal Year:

No projects will run to completion during 1945-46. A number of reports, papers, and releases can be made if staff assistance is sufficient to allow time.

6. Suggestions:

It is suggested that any effort be made to fill all staff vacancies as soon as possible. In the event that a former

staff member is not planning to return, it would be advisable to initiate steps for his replacement.

The entire project has been maintained and even expended under a reduced staff; however, it has been impossible for this staff to be as prolific in the publication of results as it should be. Re-staffing would speed up the publication of this material.

7. Additional Miscellaneous Activities of the Project Staff:

A. Radio and Club Talks:

Six Extension radio talks were made covering Soil Conservation Research and field practices.

Similar talks were presented to several service clubs.

B. Teaching and Class Work:

A number of classes from the Agronomy Department of the Virginia Polytechnic Institute have been conducted over the project and through the Soils Research Laboratory. Special demonstrations of certain laboratory procedures were given to these classes.

C. The Soil Conservation Service Project Supervisor has, by request, visited a number of Operational meetings for the purpose of gaining a closer working relationship between the Research staff and the Operations staff. The material gathered in these meetings has formed the basis of much of the post-war planning that has been done by the project staff.

In February Mr. C. E. Seitz and the Soil Conservation Service Project Supervisor visited the Southern Appalachian Forest Experiment Station, the Southeastern Section Meeting of the American Society of Agricultural Engineers, the Soil Conservation Service Experiment Station at Watkinsville, the Soils Department and the Agricultural Engineering Department at the University of Georgia and the Soil Conservation Service Research projects at Clemson, South Carolina.

The annual meeting of the Virginia Horticultural Society was attended by Soil Conservation Service personnel.

The Soil Conservation Service Project Supervisor attended a meeting and conference in Washington to develop standardized procedures for proposed permeability studies. Some discussion time was given to a proposed Orchard Erosion Control Project for Virginia.

D. Post-war Planning:

A set of eight proposed post-war projects in soil and water conservation research was prepared and submitted to College and Soil Conservation Service administrators.

During the year two complete work plans were developed to cover proposed projects. These plans are ready for immediate enactment upon receipt of funds and personnel.

One project, probably the most urgent, is a Drainage Research Project designed to meet the ever growing demand for more specific knowledge of the drainability of certain of the soils in the state.

The second project proposal prepared covers an orchard erosion control study designed to test out various terracing and cover crop methods of controlling the vast amount of erosion now taking place in Virginia orchards.

E. Soil Conservation Planning on the College Farm:

The staff continued to cooperate with college officials in extending the use of conservation practices on the college farm. The 100 acre field laid out for strip cropping in 1944 was contour cultivated during that year and is in strips in 1945. An additional 50 acre field (Field) has been laid out and will be stripped this coming year. Four additional terraces were constructed by project personnel for the Horticulture Department.

The staff assisted in the layout and design of a 5 acre contoured peach orchard on the V. P. I. horticulture farm in cooperation with the Horticulture Department and the Operations Division of the Soil Conservation Service.

F. Visitors:

During the year approximately 200 visitors have examined the project areas. Ninety of these visitors were personnel from the Virginia Operations Division of the Soil Conservation Service. Agricultural classes, statistics classes, College personnel, Regional Soil Conservation Service Technicians, and representatives from other colleges and experiment stations made up the remainder of the number.



General view of planting operations on contour peach orchard laid out by Soil Conservation Service personnel.



Pulverator plow in operation on Soil Conservation Service -
Virginia Polytechnic Institute cooperative tillage study.



Seaman Tiller in Operation on corn stubble land - Soil Conservation Service - Virginia Polytechnic Institute cooperative tillage study.

