Summary of Results of Experiments

at

WESTERN KENTUCKY SUBSTATION
PRINCETON

1927 - 1954

PROGRESS REPORT 30

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Kentucky Agricultural Experiment Station
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Contents

RESULTS OF EXPERIMENTAL TESTS

AT WESTERN KENTUCKY EXPERIMENT SUBSTATION
1927 - 1954

At the Western Kentucky Experiment Substation research projects are conducted in agronomy, horticulture, livestock, and poultry work. Some of the results are given in this summary.

AGRONOMY

The soils and crops work, conducted on approximately 1,500 plots, consists of long-time fertility projects with corn, wheat, hay, and tobacco as well as a number of variety tests. Results of fertility projects, located on limestone and sandstone soil, are given in the summary. Both soils are representative of large areas in western Kentucky. All variety tests are conducted on limestone soil. Varieties of corn, small grains, burley tobacco, and dark tobacco are compared each year as to yield, quality, and disease resistance. Also, numerous varieties of legumes and grasses are being tested. These tests are changed somewhat from year to year to incorporate new varieties.

In most of the experiments, the yields or other data are the averages of from three to six replicated plot. The difference necessary for significance between any two treatments or varieties is computed by statistical analysis. This difference is given at the foot of the tables as L. S. D. (least significant difference) at the 5-percent level. Unless the difference between any two treatments or varieties being compared is as much as the significant difference, little confidence can be put in the superiority of one over the other under the conditions of the particular test.

In several of the long-time fertility projects every third plot is a check plots. These check plots all re-

ceive the same treatment so as to measure the variations in the natural productivity of the soil. The results of the tests are given in terms of adjusted yields. The average yield of all the check plots in an experiment is given, and the yields for the treated plots are adjusted yields obtained by adding the increase for the treatments to the average yield of the check plots.

Lime and Fertilizer Experiments on Limestone Soil

From 1927 to 1944 an experiment was conducted comparing the effect of ground limestone on crops, in respect to different times of applications and also different sizes of particles. A three-year rotation of (1) corn, (2) wheat, and (3) legume and grass hay was followed. There was very little difference in crop yields, whether the limestone (2 tons) was all applied at the beginning of an 18-year period, 1 ton each 9 years, or 1/3 ton in each 3-year rotation. As for the 1/3-ton applications, there was no advantage in having the limestone finer than 10-20 mesh. In those tests, the amount of manure applied was equal to the weight of crops removed, except wheat grain.

This project has now been revised. Beginning with the 1949 corn crop, manure has been omitted from all but two plots where it is now used at the rate of 8 tons per acre of corn. Superphosphate, fused phosphate, and triple superphosphate are applied at the rate of 90 pounds of P_2O_5 and rock phosphate 180 pounds P_2O_5 per acre ahead of wheat. Muriate of potash is applied at the rate of 60 pounds K_2O ahead of wheat. Ammonnium nitrate is applied at the rate of 15 pounds N spring top-dressing on wheat and 50 pounds N broadcast ahead of corn.

The average adjusted yields from plots of certain treatments in the present project are shown in the following table. (See statement on page 3 concerning adjusted yields.)

Treatment	Corn-Bu. 6 Crops	Wheat-Bu. 4 Crops	Hay-Lb. 4 Crops
None (Av. 11 checks)	40.8	14.0	1489
Limestone	48.1	17.1	2159
Superphosphate	51.8	24.0	2289
Superphosphate Potash	49.5	24.4	2504
Limestone, Superphosphate	51.2	28.3	3414
Limestone, Superphosphate, Potash	56.0	31.4	4007
Limestone, Superphosphate, Potash, Nitrogen	58.0	34.5	3625
Limestone, Triple Superphosphate, Potash	57.4	30.3	3947
Limestone, Fused Phosphate, Potash	57.4	31.6	3644
Rock Phosphate, Potash	55.6	26.1	2861
Limestone, Rock Phosphate, Potash	53.9	26.5	3343
Manure, Limestone, Superphosphate	59.7	31.0	3718

Lime and Fertilizer Experiments on Sandstone Soil

In 1929 a liming and fertilizer test was begun on the sandstone soil, using a 3-year rotation of (1) corn, (2) wheat, and (3) grass and legume hay. All plots received an application of farm manure for the corn crop through 1948. Beginning with the 1949 corn crop, manure is now omitted from all but one of the plots.

The soil of the Substation's sandstone land was very unproductive when experimentation started. However, it has responded remarkably well to liming, fertilization, and good soil management. Phosphate alone and, especially, limestone and phosphate applied together given large increases in crop yields. The potassium and nitrogen applications very probably would have increased crop yields also, had not rather liberal amounts of manure been used on the plots previous to 1949.

Also in this experiment there is a comparison between applying all the phosphate and potash for the rotation for the corn crop and applying it for the wheat crop. In some individual comparisons corn yields were slightly greater when the fertilizer was applied for this crop, but wheat and hay yields were not so good. Considering all the crops, it has been appreciably better to apply phosphate and potash for the wheat crop. The average adjusted yields (see note on page 3 concerning adjusted yields) of the crops in the rotation from 1949 to 1953 are shown in the following table:

Treatment	Corn-Bu. 4 Crops	Wheat-Bu. 3 Crops	Hay-Lb. 3 Crops
None (Av. 7 checks)	16.2	1.7	1009
LP	53.7	20.3	3723
LPK	52.9	21.6	4176
MLP	55.6	21.2	4231
LPKN	52.5	21.8	4057
PK	40.7	12.8	2536
LP*	46.7	13.7	3027
LPK*	51.1	14.6	3239
LPN*	51.1	19.5	3001
LPKN*	54.7	21.5	2992

* Phosphate and potash broadcast before corn was planted on these plots.

M Manure at the rate of 8 tons per acre applied ahead of corn.

P Superphosphate, 20 percent, at the rate of 90 pounds P_2O_5 per acre for wheat on all plots except where specified for corn.

K Muriate of potash, 60 percent, at rate of 90 pounds K_2O per acre for wheat on all plots except where specified for corn.

N Ammonium nitrate at rate of 15 pounds N as a top-dressing on wheat and 50 pounds N per acre broadcast for corn.

L Limestone, a total of 4 tons per acre applied since 1929.

Comparison of Phosphates on Limestone Soil

This experiment, begun in 1940, is a comparison of triple superphosphate and raw rock phosphate, each

being used at various rates in a 3-year rotation of (1) corn, (2) wheat, and (3) grass and legume hay.

Rock phosphate was relatively more effective on the corn and hay crops than on the wheat. Triple superphosphate was very effective on all crops. Yields of wheat have been considerably greater from plants receiving triple superphosphate than from those receiving rock phosphate on which four times as much P_2O_5 was applied. It should be noted that when triple superphosphate was used the yields of all crops were increased materially by increasing the rate of application from 50 pounds to 100 pounds of P_2O_5 per acre.

All plots received the same application of potash and nitrogen fertilizer; limestone was applied at the rate of 1 ton per acre in the beginning and 1/3 ton in each rotation thereafter. The pH of the soil of these plots is approximately 6.4. All limestone, phosphate, and potash treatments were applied when the wheat was seeded. Limestone was used only in moderate amounts, but probably too much was used for the best performance of rock phosphate. However, rock phosphate neutralizes soil acidity only very slightly, and its application does not take the place of liming. When rock phosphate is used, only enough limestone should be applied to grow the legumes in the cropping system.

Summer drouths the past three years have greatly depressed corn yields and also the hay yields to some extent. It is known that the phosphorus in raw rock phosphate is less readily available to most crops than that in triple superphosphate. For this reason rock phosphate is used at a higher rate per acre; however, over a period of years a much larger amount of residual phosphate is left in the soil from the use of rock phosphate. All crop residues, including the corn stover and wheat straw, are removed from the plots and

no manure is used. It has been demonstrated in other tests that rock phosphate is more readily available to crops when used with manure and crop residues.

Results of the experiment are shown in the following table (All yields are an average of duplicate plots.):

Applied Rate of P_2O_5 per Rotation		Corn-Bu. 14 Crops	Wheat-Bu. 12 Crops	Hay-Lb. 14 Crops
Rock Phosphate	100	48.6	16.4	2299
Triple Superphosphate	50	48.1	26.7	2844
Rock Phosphate	150	51.1	18.7	2817
Rock Phosphate	200	53.4	19.8	3155
Triple Superphosphate	100	57.0	29.7	3748
Rock Phosphate *300-	100	51.9	18.4	2710

* 300 lb. per acre first application and 100 lb. each rotation thereafter.

Comparison of Phosphates on Sandstone Soil

A comparison of the effectiveness of superphosphate, basic slag, and raw rock phosphate (ordinary and very fine grinding) as sources of phosphate was begun in 1930 on sandstone soil.

At the rates used (twice as much phosphorus in the rock phosphate as in the other two phosphates), the three phosphates were about equally effective in this experiment. It will be noted that the corn and wheat yields were not increased by the use of ground limestone in this experiment. The average adjusted yields (see note on page 3 concerning adjusted yields) of the crops in the rotation are shown in the following table:

Treatment	Average of 22 crops		
	Corn-Bu.	Wheat-Bu.	Hay-Lb.
None (Av. 5 checks)	26.0	6.0	1481
PKN	39.2	17.9	2587
fRpKN	42.3	17.5	3221
BsKN	37.3	15.7	2913
LPKN	39.4	18.6	3277
LfRpKN	41.9	15.4	3615
LRpKN	41.1	14.2	3305

Note - Manure previously was applied to all plots until 1949 at a uniform rate based on the average yields of the check plots the preceding year.

P - Superphosphate 20 percent at rate of 60 pounds P_2O_5 per acre ahead of wheat.

Bs - Basic slag at rate of 60 pounds P_2O_5 per acre ahead of wheat.

Rp - Rock phosphate, ordinary grinding, at rate of 120 pounds P_2O_5 per acre ahead of wheat.

fRp - Rock phosphate very finely ground (300 mesh) at rate of 120 pounds P_2O_5 per acre ahead of wheat.

K - Muriate of potash 60 percent at rate of 90 pounds K_2O per acre ahead of wheat.

N - Ammonium nitrate at rate of 15 pounds N as a spring top-dressing on wheat and 50 pounds N broadcast ahead of corn (increased from 15 pounds N on corn prior to 1949).

L - Limestone, a total of 2 tons per acre applied since 1930.

Fertilizer Tests with Dark Tobacco

This study of the effect of various fertilizer treatments on yield and quality of dark tobacco was begun in 1945. The tobacco is grown on limestone soil in a 3-year rotation of (1) dark tobacco, air cured, (2) grass and legumes clipped to represent grazing, and (3) grass and legumes for hay. Comparisons are being made of farm manure and of chemical fertilizers at various rates of application and combinations.

The pH of the limed (L) plots is in the moderately acid range, and that of the unlimed plots is in the upper part of the strongly acid range. The plots are limed principally for better legume growth, but the tobacco following has benefited, probably because of a greater nitrogen supply from the legumes on the limed plots rather than as a direct result of the limestone application.

The fertilizer carriers used are ammonium nitrate, superphosphate, and sulfate of potash. Fertilizers and manure are broadcast on the sod ahead of plowing except for application at the hill of 10 pounds per acre of N, P_2O_5, or K_2O where used. Manure is used at the rate of 10 tons per acre.

The average adjusted yields and values (see note on page 3 concerning adjusted yields) of the tobacco for the eight years (1947-1954) are given in the following table:

	Treatment N - P_2O_5 - K_2O	Lb. per Acre	Value per 100 lb.	Acre value
LM	0- 60- 0 (av. 7 checks)	1394	$30.13	$420
	0- 0- 0	985	26.29	259
L	0- 60- 60	1287	30.22	389
L	30- 60- 0	1269	28.53	362
L	30- 60- 60	1394	30.42	424
L	60- 60- 60	1463	30.83	451
	60- 60- 60	1374	29.18	401
L	100-120-120	1574	31.00	488

Trace Elements for Burley Tobacco on Limestone Soil

A test for the use of the trace elements magnesium, manganese, iron, copper, zinc, and boron on burley tobacco on limestone soil was laid out in a randomized block design of four replications in the spring of 1953. All of the six elements were applied for one treatment and a different one of the elements was omitted from each of six other treatments. A check treatment with no trace elements was also used. A fertilizer application of 120-180-360 was used as a uniform treatment on all plots. No manure was used on all plots. No manure was used on any of the plots.

There has been no significant difference in yield or value between any of the treatments for the two years that the test has been under way. Results are given in the following table:

Trace Elements for Burley Tobacco
Yields and Values--2 Year Average, 1953-54

Treatment	Lb./ acre	Value, per 100 lb.	Acre* value
1 None	1825	$ 46.79	$854
2 Mg Mn Fe Cu Zn and B	1878	45.37	852
3 All except magnesium	1732	45.21	783
4 All except manganese	1767	44.59	788
5 All except iron	1805	46.87	846
6 All except copper	1775	45.30	804
7 All except zinc	1880	45.27	851
8 All except boron	1882	46.07	867
L.S.D. (5%)	NS		NS

* Values calculated from the 1953 and 1954 crop season market average for individual grades.

Trace Elements for Alfalfa on Limestone Soil

A top-dressing of the trace elements magnesium, manganese, iron, copper, zinc, and boron on limestone soil was applied May 20 following the first 1954 cutting of alfalfa sown in August 1952. One treatment consisted of all the trace elements. A check treatment with no trace elements was used and also a treatment with only boron as the trace element. A fourth treatment consisted of all the elements except boron. A fertilizer top-dressing of 0-100-120 was applied on all plots.

Three cuttings following treatment were made on June 15, July 21, and September 9. Differences between yields were not significant at the 5% level. This field had previously been treated with boron at time of seeding.

Total of 3 Cuttings of Alfalfa, 1954
Pounds per Acre Air-dry Weights,
Average of Four Replications

Treatments	Acre Yield
0-100-120 (check)	5137
0-100-120 with boron	5120
0-100-120 with all trace elements	5517
0-100-120 with trace elements except boron	5174
L.S.D. (5%)	Not significant

Variety Tests

Corn Varieties: This test is primarily for the evaluation of experimental hybrids developed by the Kentucky Agricultural Experiment Station in its breeding program. Also included are experimental and commercially available hybrids developed by other state and federal agencies, and several privately controlled hybrids. Seed of privately controlled commercial hy- of state or federally controlled hybrids was obtained from the respective experiment stations or from growers of certified seed. Yields are reported as bushels per acre of shelled corn corrected to 15.5% moisture. Corrections are made for missing hills, but not for minor variations in stand.

Average Yields of Commercial and Experimental Hybrids

	Bushels per Acre					
					Average	
Variety	1951	1952	1953	1954	1953-54	1951-54
White Corn						
*Ky 0109 (Exp)	83.8	45.7	72.9	81.9	77.4	71.1
Ky 0105 (Exp)	84.2	38.4	74.0	81.2	77.6	69.4
Ky 9105B (Exp)	79.6	42.2	71.1	84.1	77.6	69.2
*US 523W	85.5	44.5	69.5	76.9	73.2	69.1
*Ky 203	87.9	44.9	70.2	71.0	70.6	68.5
Funk's G512W	76.6	37.4	74.1	75.5	74.9	65.9
Stull 400W	78.7	38.9	68.0	72.2	70.1	64.4
Ind 750B	77.7	38.4	73.0	67.7	70.3	64.2
Broadbent 235W	73.8	41.7	65.5	69.3	67.4	62.6
Ky 9107 (Exp)	83.3	---	80.0	77.0	78.5	---
Ky 2111 (Exp)	---	---	71.8	84.2	78.0	---
Yellow Corn						
*Ky 0228 (Exp)	81.1	39.1	85.4	77.2	81.3	70.7
*US 13	75.9	39.2	71.9	73.8	72.8	65.2
*Ky 103	72.3	37.6	70.9	69.3	70.1	62.5
*Ky 102	69.5	33.5	64.9	72.1	68.5	60.0
Funk's G91	74.9	---	62.8	73.4	68.1	---
Ky 2004 (Exp)	---	---	84.9	80.2	82.5	---
Ky 1023 (Exp)	---	---	75.2	82.9	79.0	---
Ky 2026 (Exp)	---	---	76.2	80.8	78.5	---
Ky 1002 (Exp)	---	39.7	73.4	83.5	78.4	---
Funk's G134	---	---	69.7	72.0	70.8	---
Ind 844D	---	---	67.0	70.4	68.7	---
Pfister 347	---	---	62.6	63.9	63.2	---
Pioneer 301A	---	---	---	84.1	---	---
Broadbent B402	---	---	---	79.8	---	---
Stull 100Y	---	---	---	73.3	---	---
No. varieties in test (not all are shown)	35	33	49	36		
Av. of test	79.4	39.9	71.2	75.9		
L.S.D. (5%)	8.2	5.3	10.1	8.3		

(Exp) Experimental hybrid, not available commercially.

* Recommended Certified Varieties

Burley Tobacco Varieties: New burley tobacco varieties produced in the breeding program are being compared with the standard varieties as to yield and quality. Effort is being made to develop a variety that is resistant to the important diseases and will also equal or surpass the yield and quality of the better standard varieties when grown under disease-free conditions. Yields and acre values of varieties tested are shown in the following table:

Variety	Yield per Acre			Value per Acre*		
	1952	1953	1954	1952	1953	1954
Ky 16	1837	1547	1948	$922	$790	$903
Ky 57	1965	1463	1898	908	695	939
Ky 26	1783	1394	1714	889	760	795
Ky 41A	----	1568	1706	---	806	856
Ky 35	----	1392	1976	---	704	909
Ky 58	----	1255	1804	---	653	816
WF 32B	1613	----	----	532	---	---
WF 17-51	1977	----	1809	948	---	798
WF 4-51	2156	----	----	1068	---	---
WF 15-51	1957	1596	----	883	858	---
WF 1-51	1771	----	----	596	---	---
WF 31B-51	1650	----	----	701	---	---
WF 12-53	----	----	1835	---	---	864
WF 10-53	----	----	1815	---	---	805
BB 25-50	1895	----	----	885	---	---
BB 21-51	1874	1457	----	949	774	---
BB 42-51	1746	1324	----	828	723	---
BB 13-50	1970	----	----	869	---	---
BB 9-51	1725	----	----	886	---	---
BB 10-51	1791	1462	----	789	749	---
BB 11-51	1940	1374	----	919	686	---
BB 20-51	1762	----	----	862	---	---
BB 25-52	----	1486	----	---	794	---
BB 7-53	----	----	2021	---	---	947
BB 2-53	----	----	1812	---	---	906
BB 4-53	----	----	1791	---	---	879
BB 10-53	----	----	1717	---	---	852
BB 3-53	----	----	1746	---	---	834
BB 12-53	----	----	1669	---	---	831
BB 9-53	----	----	1741	---	---	740
L.S.D. (5%)	149	NS	173			

* Calculated from the season's market average for individual grades.

Dark Tobacco Varieties: Thirty of the best known varieties of dark tobacco in western Kentucky have been compared in tests started in 1926. The more desirable of these have been in the tests for periods ranging from 16 to 25 years. The testing of new varieties is much the same as in the burley variety test in that disease-resistant strains are being compared for yield and quality. Results of recent tests are shown in the following table:

Variety	Yield per Acre			Value per Acre*		
	1952	1953	1954	1952	1953	1954
Ky 153	1504	1712	----	$536	$474	$---
Brown Leaf	1384	1467	----	511	471	---
Ky 152	1252	----	----	424	---	---
Little Crittenden	1370	1476	----	469	390	---
Ky 154	1192	1607	----	386	434	---
Little Orinoco	1380	1502	----	451	352	---
West Ky 2	1252	1481	----	412	371	---
Madole	1616	1733	1690	453	448	578
DB 6-50	1011	1302	1176	320	385	407
DB 13-50	1236	1282	1452	300	383	501
DB 24-51	1444	1416	1710	462	322	549
DB 26-50	----	1593	1519	---	399	490
Ky 151	----	----	1844	---	---	713
One Sucker Types						
Ky 160-P	1474	1563	1743	540	517	670
DB 38-51	1388	----	1522	357	---	492
DB 39-51	1237	1445	1305	378	498	471
DB 42-51	1270	1310	1494	364	395	498
DB 28-52	----	1132	1414	---	357	515
DB 31-52	----	1411	1553	---	460	563
No varieties in test (not all are shown)	21	33	20	21	33	20
Av. of test	1330	1409	1486	$412	$379	$495
L.S.D. (5%)	NS	257	152	NS	98	91

* Calculated from the season's market average for individual grades (Type 36).

Characteristics of burley tobacco listed:

Ky 16 - A moderately root-rot-resistant variety introduced in 1935. It is a stand-up type and well adapted to burley producing areas. It slows growth during adverse weather and does not "spindle up."

Ky 57 - A variety highly resistant to black root rot and resistant to mosaic. The yield is very good, and the quality is high. It is similar in appearance to Ky 56 but seems to be slightly higher yielding and of better quality.

Ky 26 - This is a hybrid of Golden Burley with a highly root-rot-resistant burley. It is a stand-up type, somewhat more resistant to black root rot than Ky 16, of nearly equal yield, and of very good quality. Higher in nicotine than most widely grown varieties.

Ky 41A - Similar to Ky 16 in resistance to black root rot. It is not a typical stand-up variety. Ky 41A is one of the lower nicotine varieties.

Ky 35 - A stand-up type which is moderately resistant to black root rot and fusarium wilt, and resistant to mosaic. It is subject to damage from cool weather (may bloom prematurely), corn pollen, and veinbanding virus transmitted by aphids from potatoes. It is slightly higher in nicotine than Ky 41A.

Ky 58 - A stand-up variety, highly resistant to black root rot and resistant to mosaic. It is moderately high yielding and is lower in nicotine than Ky 57.

The other varieties listed are all experimental varieties, with various degrees of disease resistance, which are being tested for yield and quality. Those varieties preceded by the letters "WF" are wildfire-resistant lines. Progress is being made in developing a variety which has combined resistance to black root rot, mosaic, wildfire, fusarium wilt, and black shank. Selections are being made for lower nicotine content.

Forage Crops (on limestone soil): Variety studies of several legumes and grasses are being made to determine the adaptability of new varieties. All yields are given as pounds per acre of air-dry forage.

ALFALFA - Several new varieties of alfalfa are being tested to determine their value as compared with recommended varieties. Origin and characteristics of new and recommended varieties are given below:

Narragansett is a variety developed at the Rhode Island Agricultural Experiment Station by mass selection. It apparently has some tolerance to leaf diseases; the foliage is dark green; the crowns are wide, and the stems are usually erect. Small amounts of certified seed will be available in 1956.

Du Puits is a variety originated in northern France. It is vigorous, upright in growth, dark green, with some resistance to leaf diseases but susceptible to crown rot, anthracnose and bacterial wilt. No certified seed is available.

Williamsburg was developed at the Virginia Agricultural Experiment Station. Further testing is necessary to evaluate this variety.

Buffalo, recommended for use in Kentucky, was developed at the Kansas Agricultural Experiment Station by close breeding and selection out of Kansas Common. It was selected for its resistance to bacterial wilt (not important in Kentucky) and for its high production. Certified seed is plentiful.

Atlantic, also recommended for use in Kentucky, was developed at the New Jersey Agricultural Experiment Station by mass selection out of more than 100 strains and varieties. It is a variegated alfalfa, dark green, and is somewhat tolerant of leafhopper attack.

It is the highest-yielding alfalfa thoroughly tested in Kentucky. Certified seed is plentiful.

Ranger is a multiple-strain variety synthesized from Cossack, Turkistan, and Ladak at the Nebraska Agricultural Experiment Station and is recommended for use in Kentucky. It is resistant to bacterial wilt. Certified seed supplies are plentiful.

Argentine and Pilca Butta do not seem to be adapted to Kentucky and usually winter kill.

Alfalfa

	Pounds per Acre				
	Seeded 9/21/50			Seeded 8/29/52	
	1951	1952	1953	1953	1954
Variety	2 cuts	2 cuts	1 cut	1 cut*	3 cuts
Narrangansett	2056	3234	3313	969	5549
Du Puits	1989	2283	3316	**	**
Williamsburg	1567	1633	2606	**	**
Okla. Common	1227	----	----	**	**
Buffalo	1177	----	1899	944	5475
Atlantic	1148	----	2748	1017	5325
Kansas Common	1122	----	----	894	5203
Argentine	979	----	----	**	**
Ranger	686	----	1938	796	5000
Pilca Butta	123	----	----	**	**
L. S. D. (5%)	243			138	NS

---- Yields not taken due to excessive weed growth

* Yields of the second cutting are shown. First cutting was so damaged by army worms that yields were not taken

** Not seeded in this test

RED CLOVER - Two varieties of red clover are recommended, Kenland and Ky 215. Kenland was developed by the Kentucky Agricultural Experiment Station in cooperation with the U.S. Department of Agriculture. It yields, on the average, about 15 to 20 percent more than Ky 215 and has about 25 percent better stand in the spring of the third year. Both varieties are greatly superior to commercial red clover lots. Midland is a variety from the corn belt, and the other varieties originated in the state indicated by their name.

Red Clover

Variety	Seeded 4/19/51		
	Yields 1952 2 cuts	Stand in plants per sq. ft. * 3/20/52	10/29/52
Kenland (Breeder)	3517	14.0	2.6
Kenland (Foundation)	2965	11.6	1.9
Kenland (Certified)	2609	9.6	1.4
Ky 215	3243	11.5	1.6
Midland	2593	8.9	1.5
Wisconsin M.R.	1686	7.0	0.6
Louisiana Syn. No. 1	1041	4.8	0.2
Oregon Common	157	1.2	0.2
L.S.D. (5%)	468		

* Based on five randomly selected, 1 square foot areas in each plot of six replications

CRIMSON CLOVER - Most crimson clover on the market today, other than commercial or common, is of the reseeding type. Talladega, Dixie, and Auburn are reseeding varieties, originating in Georgia and Alabama. Rebel is a non-reseeding variety developed by the Mississippi Agricultural Experiment Station. The Kentucky Agricultural Experiment Station selection,

which is as yet unnamed, is very well adapted to Kentucky, being possibly a little more winter-hardy than Rebel. It was not selected for the reseeding characteristic. Little or no seed of these two varieties is available.

Crimson Clover
Seeded Sept. 6, 1952

Variety	Yield 5/8/53
Rebel	2384
Talladega	2210
Ky Exp. Sta. Selection	2176
Dixie	1695
Common	1449
Auburn	1449
L. S. D. (5%)	414

ANNUAL LESPEDEZA - Investigations are under way at the Princeton Substation and other areas of the state to determine which of the varieties of lespedeza should be recommended. Origin and characteristics of the varieties in the test at Princeton are as follows:

Kobe is a later maturing variety than any of the other varieties, and was showing a much greener color at the time of harvest which was late. The other varieties were setting seed but still held their leaves well.

Climax was developed from commercial Korean. It grows a little larger and requires a longer growing season than Korean.

Rowan is a variety of Korean lespedeza developed by the North Carolina Agricultural Experiment Station. It cannot be distinguished from other strains of Korean

lespedeza by seed or plant characteristics. It is moderately resistant to two forms of the root-knot nematode and has high resistance to powdery mildew.

Annual Lespedezas
Seeded April 17, 1953

Yields are from Volunteer Stands

Variety	Yield 10/19/54
Kobe	2064
Climax	1977
Rowan	1809
Korean Commercial	1205
L. S. D. (5%)	273

Orchard Grass
Seeded Sept. 23, 1950

		Yields in Pounds per acre			
Variety	Accession Number	1951 1 cut	1952 1 cut	1953 1 cut	Ave.
Exp. Selection	G23-233	831	1012	3827	1890
Exp. Selection	G23-231	834	1034	3675	1848
Exp. Selection	G23-228	834	982	3493	1770
Kentucky Select*	G23-145	902	835	3536	1758
Exp. Selection	G23-146	682	1048	3345	1692
Potomac	F. C. 23694	785	647	2980	1471
Exp. Selection	G23-143	711	719	2825	1418
Exp. Selection	G23-153	653	686	2897	1412
Exp. Selection	G23-158	730	682	2697	1370
L. S. D. (5%)		148	178	378	

* This variety is recommended for Kentucky conditions

Sudan Grass and Pearl Millet
Seeded May 22, 1954

Variety	Yield in Pounds per Acre Accession Number	1954 3 cuts
Piper	F. C. 31989	8740
Tift	F. C. 32136	8333
Greenleaf	F. C. 32157	8095
Common Sudan	F. C. 32007	7750
Sweet Sudan	F. C. 32006	7329
Starr Millet	F. C. 32034	4739
L. S. D. (5%)		797

Yields were taken when the sudan reached the heading stage. Ammonium nitrate was applied after each harvest at the rate of 100 pounds per acre. Leaf diseases were very severe at the time of first cutting but much less of a factor at the second and third cutting. The Greenleaf variety was the one most affected, but all the other varieties were affected to some extent, with Piper being the least damaged. Piper made the quickest return growth after mowing and Sweet sudan was considered the most leafy variety, having a much wider leaf blade than any of the others. Piper is reported to have a lower level of prussic acid content than other varieties. Tift and Piper are not sweet sudan grass varieties.

Smooth Brome Grass
Seeded Sept. 22, 1950

Variety	Accession Number	Yield in pounds per acre 1951 1 cut	1952 1 cut	1953 1 cut	Ave.
Southland	F.C. 23956	562	964	3346	1624
Oklahoma No. 1	F.C. 23955	444	896	2981	1440
Lebanon	G4-2	532	843	2825	1400
Lincoln	F.C. 23840	541	807	2801	1383
Achenbach	F.C. 23839	486	731	2863	1360
Lyon	F.C. 23842	426	634	2642	1234
Elsberry	F.C. 23838	460	585	2500	1182
Fischer	F.C. 23841	450	619	2348	1139
Lancaster	F.C. 23843	461	509	2294	1088
Bromus Erectus	G 24-2	201	685	1926	937
Martin	F.C. 23845	336	368	1224	643
Canadian Com.	F.C. 23848	231	266	----	
B. in. 12	F.C. 23844	347	307	----	
South Dakota	F.C. 23849	405	432	----	
Manchan	F.C. 23846	261	167	----	
Mandan 404	F.C. 23847	233	137	----	
L.S.D. (5%)		104	233	464	

---- Not harvested due to depleted stands

The varieties Southland, Achenbach, and Elsberry are recommended for Kentucky. Substantial amounts of seed of each, except Southland, are available.

Wheat Varieties: Various winter wheat varieties are grown from year to year to determine their relative yield and also resistance to leaf rust, stem rust, and loose smut.

Winter Wheat Varieties
Yields in Bushels per Acre

Variety	1948	1949	1950	1951	1952	1954	Average 1951 1952	Average 1948 1952
Ky R47 (Currells)	21.9	23.1	24.4	37.4	36.1	----	36.7	28.6
N.S. 6	20.4	23.0	22.7	37.1	35.0	----	36.0	27.6
Vigo	20.9	22.4	24.3	39.6	36.6	----	38.1	28.8
Thorne	20.9	22.0	27.0	36.9	38.6	----	37.7	29.1
Clarkan	20.7	22.6	27.0	35.1	35.7	----	35.4	28.2
Butler	----	21.5	27.8	36.2	35.7	----	35.9	----
Seneca	----	22.9	29.9	39.1	39.5	----	39.3	----
Knox	----	----	----	----	----	51.2		
Ky 50-9929	----	----	----	----	----	42.8		
Goens	----	21.2	26.3	35.7	----	----		
Trumbull	17.9	21.7	26.7	34.4	----	----		
Redheart	24.1	13.3	17.0	----	----	----		

Note: Severe windstorm in June 1953 after the wheat had been cut and shocked. mixed the sheaves so that individual plot yields could not be obtained. Stands of all varieties in 1954 except Knox and Ky 50 were not satisfactory for comparative yields.

Ky R47 (Currells) is a beardless, red-chaffed wheat selected from the old variety Currells. It is susceptible to leaf and stem rust but moderately resistant to loose smut. The straw is moderately strong, and on the average the variety matures 2 days before Thorne.

N.S. 6 (Poseys Bluestem Fultz) is a beardless, white-chaffed variety. It is susceptible to leaf and stem rust and is medium in resistance to loose smut. In yield, maturity, and straw strength it is similar to Ky R47, but averages lower in test weight.

Vigo (Trumbull x Fultz cross) is a beardless, white-chaffed variety and is about two days later maturing than Thorne. It is resistant to many but not all races of leaf rust. The straw is stiff, and the variety has excellent winterhardiness. It tends to shatter when ripe. It has good milling and baking qualities and is high yielding. (Recommended for western Kentucky.)

Thorne is a beardless, brown-chaffed, and red-grained wheat. It has very stiff straw and is excellent for combine harvesting. It is also inherently lower in test weight. It is susceptible to the rusts, but highly resistant to loose smut.

Clarkan is a beardless, white-chaffed variety. It is susceptible to leaf rust and loose smut but has some resistance to stem rust. It is about 2 days later maturing than Thorne, and while it has a slightly hard kernel it can be used for soft wheat milling.

Butler is a bearded, white-chaffed, and red-grained wheat. It has straw as good as Thorne and has good bushel weight. Flour quality is only fair.

Seneca is a sister selection to Thorne and is very similar in nearly all particulars. It is beardless, brown-chaffed, and red-grained. It is high-yielding, has stiff straw, and does not shatter when overripe. It mills well and the flour is satisfactory to the trade.

Knox is a beardless, white-chaffed, short-strawed, and extremely early variety. It was developed at the Purdue Agricultural Experiment Station. It matures from 10 to 14 days before Thorne and has a high resistance to leaf rust. Its early maturity gives it the abiity to escape stem rust. It is acceptable to the soft wheat millers and pastry bakers. (Recommended for western Kentucky.)

Ky 50-9929 is an experimental variety which needs further testing.

Goens is an old variety grown in the Ohio river bottom. It is bearded, brown-chaffed and very susceptible to loose smut.

Trumbull is a beardless, white-chaffed selection out of Fultz. It is susceptible to the rusts but is resistant to several races of loose smut. It is one of the best quality soft wheat milling varieties but does not seem to have any particular advantage under Kentucky conditions.

Redheart is an early-maturing variety which usually escapes the rusts. It is not winter hardy under Kentucky conditions and usually winter kills to some extent.

Note: The hard and semi-hard wheats are not satisfactory for the soft wheat milling trade for which Kentucky wheat is used. They are not well adapted to Kentucky climate and soils and should not be grown since any appreciable quantity in commercial wheat would make the crop unsuitable for milling.

Chemical Control of Tobacco Suckers

Tests are being conducted in controlling suckers on dark tobacco by using different rates of maleic hydrazide and also different rates of mineral oil emulsion. The treatments are applied at topping time and the results are compared with a check or untreated tobacco in replicated plots.

The treatments used are:

1 - Mineral oil and water in equal amounts, used at the rate of 5 cc per plant on topped stalk.

2 - Same as treatment 1 except used at rate of 10 cc.

3 - Maleic hydrazide 30%; 30 cc in 1 quart of water plus a wetting agent; sprayed on top half of plant at topping time at rate of 40 plants per quart.

4 - Same as treatment 3 except used at rate of 20 plants per quart.

5 - Check; no treatment.

The results of the test in 1954 are given in the following table. The tobacco was suckered four different times, and each time suckers were counted by plots.

Tobacco Sucker Control - 1954

	Average of six replications			
	Lb/ acre	Value, per 100 lb.	Acre Value	Suckers per plant
1 Oil 5 cc	2008	$37.20	$747	9.9
2 Oil 10 cc	1937	37.43	725	7.9
3 MH 40/qt	1944	37.09	721	14.8
4 MH 20/qt	1915	37.02	709	5.1
5 Check	1950	37.03	722	24.9
L.S.D (5%)	NS		NS	2.8

This test was also conducted in 1953 with similar sults. It has been found that suckers can be controlled to the degree that, on the average, approximately five times as many suckers are produced by the untreated tobacco as compared with the best of the treatments. Maleic hydrazide used at the lighter rate did not give satisfactory control of sucker growth after the second suckering. For the two years that the test has been conducted, there has been no significant difference in yield or acre value between the untreated tobacco and that given any of the treatments. Laboratory tests are being run to determine if there is any change in the nicotine content of the treated tobacco. At present none of the treatments is recommended.

ANIMAL HUSBANDRY

Kentucky Cow and Calf Plan - 1953 and 1954

Three groups of 10 cows each were used to produce milk-fat calves in 1953 and 1954. The three groups were grade Herefords, Crossbreds showing both beef and dairy breeding, and Jerseys. Calves produced in both years were sired by Hereford bulls.

The three groups of cows were kept together and treated alike at all times. The winter ration was corn silage, hay and soybean oilmeal. Enough corn was fed after calving during the winter of 1952-53 to compensate for the lack of corn in the poor silage produced during the drouth of 1952. All cows and calves grazed together during the pasture season.

Because of the drouth in 1953, it became necessary to feed the cows and to creep-feed the calves from September 9 until the calves were sold on November 1. Feeding again became necessary in 1954 from September 18 to October 4, and from October 19 to November 9. During these dry periods, the cows were fed hay and silage and the calves were creep-fed a mixture of 9 parts cracked corn and 1 part soybean oilmeal.

The results of 1953 are summarized below:

	Breed		
Data	Hereford	Crossbred	Jersey
Birth date	Jan. 19	Jan. 9	Jan. 16
Birth wt., lb.	66.83	64.2	64.6
Av. daily gain, lb.	1.61	1.76	2.01
Final wt., lb.	526.67	579.44	645.5
Grade, live, choice	66.66%*	66.66%*	60.0%*
Grade, carcass	Good plus	Good plus	Choice
Dressing %	56.48	56.26	59.07
Value per calf	$84.10	$95.60	$102.99

* Remainder of calves in all groups graded Good.

The results for 1954 are summarized below:

Data	Breed		
	Hereford	Crossbred	Jersey
Birth date, av.	Jan. 11	Jan. 21	Jan. 28
Birth wt., av., lb.	71.75	71.56	71.40
Av. daily gain, lb.	1.73	1.87	2.05
Final wt., lb.	591.88	616.67	655.0
Grade, live, choice	50.0%	44.44%	22.22%
" " , good	50.0%	44.44%	55.55%
" " , commercial	--	11.11%	22.22%
Grade, carcass	good plus	choice minus	choice
Dressing %	57.83	59.41	60.59
Value per calf	$111.28	$111.26	$113.77

Protein Supplements for Growing and Fattening Pigs on Pasture
(Summary of 3 Year's Work)

For three consecutive years, 1952, 1953 and 1954, two protein supplements were fed pigs on pasture under two methods of feeding. A mixture of alfalfa and bluegrass was used the first two years and a pure stand of alfalfa was used the third year. There was practically no pasture during July and August the first year. Pasture was some what better the second year, but was still extremely poor during late summer. The alfalfa was generally good the third year.

Two replicate lots of 5 pigs each were self-fed free-choice each of the supplements, shelled yellow corn, a simple 2-2-1 mineral mixture and loose salt. Fresh water was available to pigs in all lots at all times.

The supplements fed and the methods of feeding were as follows:

Lot 1 - 50 pounds of soybean meal plus 50 pounds meat scraps were fed throughout the experiment.

Lot 2 - 48 pounds of soybean meal plus 48 pounds meat scraps plus 4 pounds Vitamin B_{12} antibiotic supplement were fed throughout the experiment.

Lot 3 - Supplement No. 1 was fed until pigs weighed between 75 and 85 pounds and was discontinued.

Lot 4 - Supplement No. 2 was fed until pigs weighed between 75 and 85 pounds and was discontinued.

Pigs were started on feed at a weight of 45 pounds and removed when they reached a lot average of approximately 200 pounds.

Alfalfa in lots without supplement was grazed much shorter than in the lots with supplement. Pigs in lots without supplement would graze much longer each day.

After removing the supplement in lots 3 and 4, average daily feed consumption and average daily gains were less, and feed efficiency was poorer for the first 2-week period but made a slight improvement the following 2 weeks. With much improved pasture the third year, daily gains increased for feed efficiency improved after the first 2-week period following the removal of the supplement. Daily gains and daily feed consumption remained a little under that of the supplement lots but feed efficiency surpassed the supplement lots during some of the 2-week periods.

Results - Average of 3 Years, in pounds

	Daily	Daily	Feed per 100 pounds gain		
Lot	Gain	Feed	Corn	Supplement	Total
1	1.56	4.92	271.4	43.4	314.8
2	1.60	4.96	270.3	38.9	309.1
3	1.22	4.19	338.8	6.2	345.0
4	1.32	4.37	324.2	7.3	331.5

Winter Pasture for Growing and Fattening Pigs

Two trials of an experiment comparing rye and fescue pasture with a dry lot were conducted during the winters of 1953-54 and 1954-55. Approximately one-half acre lots of rye and fescue were used both years. A small enclosure was used for the dry lot the first year, while a dry lot about the same size as the pasture lots was used the second year. The same ration was self-fed both years to all three lots. The rye lot was cross drilled both years at the rate of three bushels per acre. Both pasture lots were treated with ammonium nitrate at the rate of 200 pounds per acre the first year and at the rate of 100 pounds per acre the second year.

A mixed ration consisting of ground yellow shelled corn, soybean oilmeal, meat scraps, alfalfa meal, ground limestone, salt, trace minerals and vitamins A, D, B complex and vitamin B_{12} antibiotic supplement was used. The protein level was lowered from 15 percent to 13 when the pigs reached an average weight of approximately 75 pounds.

Twelve pigs per lot were used the first year, and 10 per lot the second year.

A summary of the data for the two years follows:

Lot	Starting Weight, lb.	Final Weight, lb.	Daily Gain, lb.	Feed per 100 lb. Gain	Daily Feed Consumption, lb.
Rye	48.08	207.30	2.17	326.33	7.07
Fescue	48.86	206.20	2.14	333.11	7.14
Dry Lot	48.30	201.85	2.00	334.37	6.66

Detergent Experiment - Winter 1952-53

An experiment was conducted during the winter of 1952-53 to determine the value of two detergents the ration of growing and fattening pigs. The basal ration consisted of ground yellow corn, meat scraps, soybean meal, alfalfa meal, minerals, Vitamin B_{12} antibiotic supplement, and vitamins A, D, and B complex. Lot 1 was fed the basal ration plus the detergent Oronite; Lot 2 was fed the basal ration plus the detergent Phenyl Polyglycol N5; and Lot 3 was fed only the basal ration

The starting ration containing 16 percent protein was reduced to 14 percent protein when the pigs averaged 75 pounds per lot which in turn was reduced to 12 percent when an average weight of 125 pounds was reached. The ration in each lot was self-fed. Ten pigs were used per lot.

The results are listed in the table below:

Lot	Starting Weight, lb.	Final Weight, lb.	Daily Gain, lb.	Feed per 100 lb. Gain	Daily Feed Consumption, lb.
1	44.05	206.45	2.03	342.24	6.95
2	43.78	208.35	2.06	327.70	6.74
3	43.80	201.53	1.97	330.28	6.51

Sheep: Results for 1952

Forty Suffolk-Cross Idaho ewe lambs were equally divided and bred as lambs in the fall of 1951 to a Suffolk and Southdown ram. After the breeding season all ewes were housed, fed and pastured together.

Birth weights for lambs in the Suffolk and Southdown groups were, respectively, 9.96 and 8.54 pounds for the single lambs and 6.71 and 7.14 pounds for the twin lambs. Twenty-eight day weights for the Suffolk and Southdown sired lambs were, respectively, 29.29 and 26.68 pounds for the single lambs and 20.13 and 20.93 pounds for the twin lambs. Fifty-six day weights of the Suffolk and Southdown groups were 48.81 and 43.78 pounds respectively for the single lambs and 36.73 and 35.44 pounds respectively for the twin lambs. Lambs sired by the Suffolk were 19.51 days older than the lambs sired by the Southdown ram.

Market and Carcass Data

Sire	No. Sold	Average Weight, lb.	Average Market Price	Value Per Lamb	Live Grades	Carcass Grades	Dressing Percentage
Suffolk	22	95.91	$25.93	$24.87	4 Prime 17 Choice 1 Good	4 Prime 17 Choice 1 Good	51.48
Southdown	16	78.13	$23.74	$18.55	9 Choice 7 Good	1 Prime 10 Choice 5 Good	50.11

Sheep: Results for 1953

The same ewes and rams were used to produce lambs in 1953, and the experiment was conducted in the same manner as in 1952.

Birth weights for lambs in the Suffolk and Southdown groups were, respectively, 9.79 and 9.51 pounds for the single lambs and 9.22 and 8.31 pounds for the twin lambs. Twenty-eight day weights for the Suffolk and Southdown sired lambs were, respectively, 33.12 and 31.64 pounds for the single lambs and 27.60 and 24.50 pounds for the twin lambs. Fifty-six day weights for lambs in the Suffolk and Southdown groups were, respectively, 56.56 and 53.00 pounds for the single lambs and 49.95 and 43.57 pounds for the twin lambs.

Market and Carcass Data

Sire	No. Sold	Average Weight, lb.	Average Market Price	Value Per Lamb	Live Grades	Carcass Grades	Dressing Percentage
Suffolk	18	90.00	$19.94	$ 17.95	3 Prime 9 Choice 6 Good	1 Prime 11 Choice 6 Good	50.09
Southdown	25	79.20	$22.14	$ 17.53	7 Prime 15 Choice 3 Good	10 Prime 12 Choice 3 Good	49.69

Sheep: Results for 1954

Twenty Rambouillet-Cross Texas ewes were added to the flock during the summer of 1953. These were divided equally and placed with the other two groups for breeding. A Hampshire and a Southdown ram were used on the two groups.

The birth, 28- and 56-day weights of lambs produced by the two types of ewes in 1954 were as follows:

Type of Ewe	Birth Weight, lb.	28-Day Weight, lb.	56-Day Weight, lb.
	Single Lambs		
Idaho	5.37	24.50	40.00
Texas	9.18	29.64	48.82
	Twin Lambs		
Idaho	7.80	25.20	39.40
Texas	6.71	21.68	33.94

DAIRY

The dairy herd of registered Jerseys includes approximately 25 cows and 25 heifers and calves. This herd has been developed over a 30-year period from a few foundation heifers furnished by the Kentucky Agricultural Experiment Station at Lexington. No additional females have been purchased.

Both natural and artificial breeding have been practiced. The last two bulls used have been loaned to the Substation by the Kentucky Artificial Breeding Association for proving. The present bull, Brigham Cadman Jathan, No. 551881, came from Brigham Farm in Vermont. His sire, Sybil Owl Cadman, No. 475548, is an Excellent Superior sire with 16 daughters averaging 10,028 pounds of milk and 517 pounds of butterfat. His dam, Sybil Owl Wanted, No. 1349773, is a "Ton of Gold" cow.

The herd is enrolled in the Dairy Herd Improvement Association and the American Jersey Cattle Club's Herd Improvement Registry. Records obtained have furnished proof on numerous bulls, including Radiant Jewel who is now in the bull stud.

The herd is tested regularly for Bang's disease and tuberculosis. Calfhood vaccination against Bang's disease has been followed for several years.

Dairy Pasture Test

This experiment is a comparison of orchard grass and ladino clover with Ky 31 fescue and ladino clover as pasture for dairy cows. The test is located on four 5-acre plots, two of which are in orchard grass and ladino and two in Ky 31 fescue and ladino pasture.

Seedings were made on March 11, 1954. Seeding rates were 10 pounds per acre for the grasses and 1 1/2

pounds per acre for the ladino clover. Good stands were obtained. The soil had been limed and phosphated in 1952. In the fall of 1954 all plots were top-dressed with 0-10-20 fertilizer at the rate of 500 pounds per acre. Additional seedings of ladino clover have been made in an effort to increase the stand in some areas where clover was thin.

The plots were pastured with dairy cows from June 8 to August 18, 1954, when grazing was discontinued because of dry weather. Records were kept on milk and butterfat production and body weights of cows. Total digestible nutrients produced and persistency of production were calculated for each plot. Both mixtures produced similarly, but results for such a short period of time are insufficient to draw conclusions.

This test is being continued in 1955. Pasturing began March 16 but was discontinued March 26 for several weeks because grass and clover were frozen by unusually cold weather.

POULTRY HUSBANDRY

Feeding Practices for Laying Hens

Four hundred forty New Hampshire pullets were selected in August 1954 from the Substation flock for use in a test comparing feeding practices for laying hens. These were divided uniformly into four pens with 110 pullets each and were fed as follows:

Pen 1 - Regular grain mixture (50% whole corn
(25% whole wheat
and (25% whole oats
Regular 20% protein laying mash self-fed in separate hoppers

Pen 2 - Regular grain mixture hand-fed twice daily
Regular 20% protein laying mash self-fed

Pen 3 - Regular grain mixture ground and mixed with Regular 20% protein laying mash self-fed as all-mash

Pen 4 - High efficiency laying mash (all-mash) self-fed

Egg production, feed consumption and mortality, September 1954 through May 1955, are shown in the following table:

Pen No.	Eggs per Hen	Total Feed Consumed per Hen, lb.	Feed per doz. Eggs Produced, lb.	Mortality Percentage
1	135.1	91.42	8.14	14.5
2	148.5	97.20	7.85	4.5
3	140.9	90.57	7.71	8.2
4	140.0	85.21	7.30	6.4

Sulfaquinoxaline in the Starting Mash for Coccidiosis in Chicks

A two-year study of the effect of sulfaquinoxaline in

the starting mash for baby chicks was conducted in 1952 and 1953. Each year two broods of 300 New Hampshire chicks were fed a basal mash and two similar broods were fed the basal mash plus sulfaquinoxaline during the first 12 weeks. Chicks fed only the basal mash were treated with sulfaquinoxaline when symptoms of coccidiosis appeared. All chicks were brooded on soil infested with coccidia.

Coccidiosis control was satisfactory in all pens and very little mortality could be attributed to this disease in any of the lots. Dry weather conditions were favorable for its control both years. The first year the pullets fed the medicated mash averaged 0.3 pounds heavier at 24 weeks of age, but the second year there was practically no difference in weight. Production per hen the first year was 200 eggs for the birds started on the basal mash and 188 eggs per hen for those started on the basal mash plus sulfaquinoxaline. During the second year there was no difference in production of three pens, but the fourth, from one of the medicated broods, produced somewhat less than the other three.

HORTICULTURE

Soil Management Studies with Apples and Peaches

Soil management tests on apples, under way for over 20 years, gave heavier growth and yields on cultivated plots during the earlier years of the tests. However, during the later years, the cultivated plots lost considerable vigor and had reduced yields and fruit size. This was due in part to soil erosion in the cultivated areas. On the other hand, trees that were in lespedeza sod after the first few years of cultivation, retained their vigor, production, and fruit size, and the plots suffered very little soil loss from erosion. Results of long-time plots on peaches, now discontinued, were somewhat similar.

A new planting of 162 Elberta peach trees was started in 1950 comparing Korean lespedeza, ladino clover, and cultivation along with variations in nitrogen fertilization. Very light crops were produced in 1953 and 1954, the crops being reduced each year by cold and frost damage. In 1953, there was little difference between the crops on the sod plots and the cultivated ones; however, in the summer of 1954 the yield, tree growth and fruit size were greatest from the cultivated plots. Varying the amounts of nitrogen had little effect on yield and trunk growth during the dry season of 1953 and and 1954.

Fruit Variety Tests

As in former years, comparative variety tests are being conducted with peaches, apples, plums, pears, black raspberries, strawberries, grapes, and black walnuts.

Peaches: The best peach varieties from early to late, that have been fruited here are: Dixired, Early Red Free, Raritan Rose, Redhaven, Golden Jubilee, Triogem, Fairhaven, Prairie Rose, Nectar, Halehaven,

July Heath, Ambergem, Summercrest, Veteran, Elberta, Redskin, Shippers Late Red, Afterglow, Late Rose and Lizzie.

A new variety planting made in the spring of 1955 contains such very new kinds as Cardinal, Sunrise, Tulip, Sunhaven, Prairie Sunrise, Coronet, Ranger, Keystone, Redglobe, Loring, Fireball, Ozark, Richhaven, Blake, Poppy and others.

Apples: Lodi is a promising new early apple variety for shipping and home use. Of the older varieties, Yellow Transparent, Polly Eades, Paducah, Grimes, Jonathan, and Stayman have been good consistent producers. A new variety planting of apples is being started in 1955, using mostly early varieties.

Plums: The French damson variety has been the most desirable of the damsons. The fruit is larger and sweeter and is a regular bearer. Bruce, an early red plum, and Munson, an early yellow plum, have borne regular heavy crops. The new Stanley prune has shown promise as a mid-season black fruited plum.

Pears and Black Walnuts: A pear and black walnut planting, just starting to bear, will soon furnish some information on these tree crops.

Strawberries: Blakemore remains the leading early variety for shipping and home use. Tennessee Beauty has been the outstanding new strawberry variety tested. It has replaced Aroma as a late shipping berry. It generally doubles or triples Aroma in yield and is a better shipping, quick-freezing, and preserving berry. Tennessee Shipper, a very firm berry, ripening between Blakemore and Tennessee Beauty, is third on the variety list. It is a dependable berry but averages a bit less in yield than the two leaders. Temple and Fairland, varieties resistant to red stele root-rot, have produced well

and can be grown for home use and local markets in areas where ordinary, non-resistant varieties cannot be grown on account of this disease.

Pocahontas and Dixieland, two promising new varieties, gave very heavy yields at Princeton when fruited in 1952 as numbered selections from the U.S. Department of Agriculture. Additional plots of these will be fruited in 1955. Armore has also looked promising as a medium-late variety. Albritton has had vigorous plants and fine fruits but has been somewhat shy in bearing.

A large number of the new selections from the Kentucky strawberry breeding project will be planted in 1955 for their first fruiting in western Kentucky. It is hoped that some excellent varieties will be developed from this work.

Everbearing Strawberries: Beds of everbearing strawberries planted in the springs of 1952 and 1953, and given the recommended cultural treatments of runner removal, sawdust mulch and irrigation, fruited satisfactorily again in the spring of 1954 in spite of an unfavorable soil condition and two hot, dry summers. These plantings have indicated that with the proper treatments, everbearing strawberries can be planted in the spring and may be harvested from mid or late July until frost. A crop can also be expected the next spring, followed by a summer and fall crop from the same plants.

Over the three-season period, Gem was the most satisfactory variety, ranking first in yield in 1953 and second each of the two other years. The 20th Century variety produced the highest yield the first year but was almost eliminated in 1953 by an attack of red stele. This disease seriously damaged Red Rich but caused less damage to Gem and Brilliant.

Grapes: The Concord has been the leading bunch grape. It ripens in late August, is black in color and is excellent for juice, jelly or eating fresh. Fredonia, an early ripening black grape, has been the leading early grape. However, Buffalo, newer early black grape, was outstanding in a young variety planting in 1954. Other new varieties that looked promising in 1954 were Steuben and Schuyler, black grapes, and Yates, a red grape. Other varieties that have looked promising in the older planting were Portland and Niagara, white grapes, and Delaware, Catawba and Ellen Scott, red grapes. Several more of the newer introductions have been planted but have not yet borne.

French-American Hybrid Grapes: Seventeen of these varieties were planted in 1952. These are vigorous new grape types, developed in Europe from crosses of certain native American grapes with European types. There are many of these selections with various types and colors of fruits and variation in ripening season. Some are suitable for eating fresh, some for juice, some for wines and some for several purposes. Among those that fruited heavily that were considered to be of good eating quality were: Seibel 9110, S.V. 5-276, Seibel 5279, Seibel 14483, Seibel 7053 and Baco 1.

Black Raspberries: In a new planting made in 1952, the Bristol variety has yielded heaviest and has been more satisfactory, followed by New Logan, Cumberland and Morrison, in that order. The soil plots that have been heavily mulched (entirely covering the soil) with a combination of waste hay, straw and manure have been much more vigorous and heavier producing than the partially mulched or clean cultivated plots. In the spring of 1953, however, the heavily mulched area was severely injured by a late frost while the berry plants in the cultivated area had a vigorous cover crop growing and was not damaged.

Blueberries: The blueberry planting made in 1952 has had great difficulty becoming established during the three hot, dry summers of 1952, 1953 and 1954. A number of replants have been needed, and it is hoped that growth will now be more satisfactory.

Weather Conditions

1. 1950-51 Cold Damage: The record low temperatures of -8° on November 24, 1950, and of about -20° on February 2, 1951, caused much killing of young apple and peach trees. Also, internal wood injury was caused to many mature peach and apple trees, and trunk and crotch injury cankers were caused on many trees 5 to 12 years old, especially if they had been growing rapidly.

2. Drouths of 1952, 1953 and 1954: These three hot, dry summers caused much damage to the tree crops on the station grounds. This was reflected in short growth and small sized fruit all three seasons.

3. Crop Failures from Low Temperatures: Record-breaking low temperatures of 10° and 13° on March 26 and 27, 1955, after growth had started, virtually wiped out the peach, apple, pear, plum and cherry crops in the Substation orchards, as well as in a large part of Kentucky and most of the southern states. Although this cold wave was a record low for late March with four consecutive nights of hard freezes, peaches have been frequently killed in the past by spring freezes and occasionally by sub-zero winter weather. Records on the Jacob Tract, combining the history of two Elberta plantings, show that there were 6 crop failures, 9 partial crops, varying from 10 to 50 percent of a full crop, and only 4 full crops during 19 years of bearing age of the orchards. In another Elberta planting, on the lower ground of the O'Hara Tract, there were 10 crop failures, 1 half crop and only 3 full crops of peaches curing 14 years of bearing age. Some earlier and more hardy varieties have produced fair-to-full crops about half the years and light crops to failures the other half.