PROGRESS REPORT

FORAGE CROP INVESTIGATIONS

1962

FORAGE MANAGEMENT

Crop Science Department
Ontario Agricultural College
Guelph

Forage Progress Report - 1962

This report contains data on O.A.C. trials. It is not complete in that only the data summarized by April 1, 1962, are included. The report is prepared for use of the members of the Crop Science Department and for those associated with the forage program.

A federal-provincial program is in operation in variety and mixture testing and in orchardgrass breeding. This report contains some of the data collected by the Field Crops Division, Western Ontario Agricultural School, and by the Field Husbandry Division, Kemptville Agricultural School, but does not include data collected by federal stations in the co-ordinated program. The complete data from all stations for the co-ordinated program, are available in the report of the annual meeting of the Forage Crop Sub-committee for Recommendations, November, 1962.

CONTENTS

(Year refers to year trial was seeded, and number in brackets is experiment number)

1962 GROWING SEASON WEATHER RECORD

TEMPERATURE		APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
Harrow	Max.	57.2	74.5	78.8	77.8	78.6	68.8
	Min.	37.5	53.4	59.4	60.8	60.9	52.9
Ridgetown	Max.	56.4	73.3	76.3	78.4	78.5	67.8
	Min.	36.1	51.4	57.6	58.4	59.3	51.0
Guelph	Max.	53.0	70.2	72.8	73.3	77.8	65.3
	Min.	33.3	47.4	53.3	54.5	53.6	44.7
Kemptville	Max.	50.0	69.8	76.6	77.1	77.9	65.7
	Min.	30.0	44.5	51.2	52.7	55.8	46.6
Ottawa	Max.	50.3	69.3	76.6	75.8	76.5	64.6
	Min.	31.3	47.3	54.4	53.0	56.6	46.8
New Liskeard	Max.	43.4*	66.1*	72.5*	76.7*	74.4	60.9*
	Min.	24.7*	42.9*	43.6*	49.4*	50.9	43.0*
Kapuskasing	Max.	40.8	62.7	71.4	73.5	69.8	57.3
	Min.	19.9	37.5	40.1	48.0	43.3	40.3
Gore Bay	Max.	46.4	63.8	71.2	76.2	73.9	62.8
	Min.	29.4	42.9	50.8	55.2	55.5	47.8
Fort Francis	Max.	45.3	62.7	72.2	73.5	74.6	63.3
	Min.	24.5	42.9	52.0	53.0	53.1	42.2

RAINFALL						
Harrow	1.23	1.41	2.02	6.08	3.40	2.67
Ridgetown	1.72	1.12	4.60	3.61	5.65	2.97
Guelph	2.12	0.94	3.36	3.04	2.00	2.67
Kemptville	2.49	1.68	2.60	3.82	1.75	2.92
Ottawa	2.38	1.52	2.88	5.09	2.21	2.77
New Liskeard	inc.*	inc.*	2.00	3.27	1.95	2.44
Kapuskasing	0.76	6.38	2.02	4.74	6.29	5.05
Gore Bay	1.86	3.41	0.68	0.75	2.40	4.09
Fort Francis	0.74	7.12	3.67	5.59	2.90	4.11

* incomplete data

DEPARTURES OF 1962 GROWING SEASON

FROM NORMAL

TEMPERATURE		APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
Harrow	Max.	+1.1	+6.1	- .1	-6.0	-3.3	-5.9
	Min.	+1.3	+6.6	+1.7	-2.6	+ .9	-1.5
Ridgetown	Max.	+3.7	+8.5	- .4	-3.5	-1.6	-4.3
	Min.	+ .6	+5.6	+1.3	-2.7	- .4	-2.9
Guelph	Max.	+2.3	+6.6	-1.3	-5.6	+ .5	-4.6
	Min.	+ .9	+4.5	+ .7	-2.4	-2.0	-4.3
Kemptville	Max.	-1.5	+3.3	+ .1	-4.3	- .9	-4.4
	Min.	-1.8	+ .4	-2.5	-5.3	- .2	-1.5
Ottawa	Max.	+0.5	+4.0	+1.4	-4.0	-1.3	-4.2
	Min.	+ .1	+4.1	+1.4	-4.5	-1.6	-1.1
*New Liskeard	Max.	-2.5	+3.9	+ .1	- .1	- .4	-4.0
	Min.	+ .4	+6.5	-3.9	-3.7	+ .2	- .1
Kapuskasing	Max.	-1.4	+5.1	+2.0	-1.0	-1.5	-3.9
	Min.	+ .5	+3.6	-5.0	-3.2	-6.3	-1.3
Gore Bay	Max.	-1.4	+5.5	- .1	-1.5	-1.5	-1.5
	Min.	+2.1	+4.4	+2.4	+ .5	+1.9	+ .4
Fort Francis	Max.	-2.7	+ .4	+ .7	-4.1	+.3	- .7
	Min.	-3.9	+1.7	+ .9	-2.6	-1.0	-3.1

RAINFALL						
Harrow	-1.3	-1.0	-1.0	+3.8	+1.2	+ .2
Ridgetown	-1.3	-2.0	+1.7	+ .7	+3.2	+ .1
Guelph	- .6	-2.2	+ .2	- .5	- .9	- .3
Kemptville	- .1	-1.6	0.0	+ .3	- .8	- .3
Ottawa	- .2	-1.3	- .5	+2.4	- .8	- .3
New Liskeard	--	--	-1.3	- .3	-1.0	- .9
Kapuskasing	-1.0	+4.0	- .7	+1.4	+3.0	+1.9
Gore Bay	- .4	+1.1	-1.8	-1.2	+ .3	+1.0
Fort Francis	-1.4	+4.5	- .2	+2.0	-1.0	+ .8

* Incomplete data

NORMAL GROWING SEASON WEATHER RECORDS FOR CERTAIN ONTARIO STATIONS

TEMPERATURE		APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
Harrow	Max.	56.1	68.4	78.9	83.8	81.9	74.7
	Min.	36.2	46.8	57.7	62.2	60.0	54.4
Ridgetown	Max.	52.7	64.8	76.7	81.9	80.1	72.1
	Min.	35.5	45.8	56.3	61.1	59.7	53.9
Guelph	Max.	50.7	63.6	74.1	78.9	77.3	69.9
	Min.	32.4	42.9	52.6	56.9	55.6	49.0
Kemptville	Max.	51.5	66.5	76.5	81.4	78.8	70.1
	Min.	31.8	44.1	53.7	58.0	55.6	48.1
Ottawa	Max.	49.8	65.3	75.2	79.8	77.8	68.8
	Min.	31.2	43.2	53.0	57.5	55.0	47.9
New Liskeard	Max.	45.9	62.2	72.4	76.8	74.8	64.9
	Min.	24.3	36.4	47.5	53.1	50.7	43.1
Kapuskasing	Max.	42.2	57.6	69.4	74.5	71.3	61.2
	Min.	19.4	33.9	45.1	51.2	49.6	41.6
Gore Bay	Max.	47.8	59.3	71.3	77.7	75.4	64.3
	Min.	27.3	38.5	48.4	54.7	53.6	47.4
Fort Frances	Max.	48.0	62.3	71.5	77.6	74.3	64.0
	Min.	28.4	41.2	51.1	55.6	54.1	45.3

RAINFALL						
Harrow	2.5	2.4	3.0	2.3	2.2	2.5
Ridgetown	3.0	3.1	2.9	2.9	2.4	2.9
Guelph	2.7	3.1	3.1	3.5	2.9	3.0
Kemptville	2.6	3.3	2.6	3.5	2.6	3.2
Ottawa	2.6	2.8	3.4	3.5	3.0	3.1
New Liskeard	1.7	2.2	3.3	3.6	2.9	3.3
Kapuskasing	1.7	2.3	2.8	3.3	3.2	3.2
Gore Bay	2.3	2.3	2.5	2.0	2.1	3.1
Fort Frances	2.1	2.6	3.9	3.6	3.9	3.3

PROVINCIAL HAY - PASTURE MIXTURES FOR AREAS OF GOOD DRAINAGE, SERIES A

Percentage* of the number of times that the mixture is equivalent to the highest yield.

No.	Mixture	Hay	Aftermath	Season Total
7	Vernal 8 Dupuits 2 Climax 6	37.5	66.6	54.1
8	Vernal 5 Dupuits 5 Climax 4 Lincoln 6	75.0	95.8	95.8
3	Vernal 8 Lasalle 2 Climax 6	58.3	62.5	58.3
1	Vernal 8 Lasalle 2 Climax 4 Lincoln 6	70.8	54.1	66.6
2	Vernal 8 Lasalle 2 Climax 4 Orchard 3	41.6	45.8	37.5
10	Vernal 6 Lasalle 4 Climax 2 Lincoln 5 Orchard 4	66.6	33.3	58.3
4	Vernal 10 Lincoln 10	79.1	66.6	75.0
9	Vernal 10 Climax 6	54.1	58.3	54.1
5	Vernal 6 Lasalle 3 Climax 5 Lincoln 6 Ladino 1	66.6	75.0	58.3
6	Vernal 5 Lasalle 3 Climax 3 Lincoln 5 Orchard 2 Alsike 1 Ladino 1	70.8	41.6	41.6

* 24 years (3 years at each of 8 locations).

Analysis of Variance Table for Hay Yields

Mean Squares of Locations

		Zone and Station							
		1 & 2	4		5		7		8
Variables	d.f.	Ridgetown	Guelph	Mindemoya	Kemptville	Ottawa	Ft. William	Ft. William	Kapuskasing
Replications	3	288381.3	5358664.0	2900032.0	215194.7	320786.7	1846277.3*	5323586.7	1599512.3
Years	2	4555240.0	56906912.0*	12948680.0*	2319128.0*	5487808.0	72536407.0**	10C205110.0**	3112889.5
Error A	6	218801.3	7419058.7	127901.4	337021.3	366486.0	260877.3	4909192.0	722727.8
Mixtures	7	1799676.6**	1020608.0**	1203392.0**	2209806.9**	563877.7**	239028.6	819278.8	459119.6*
Mix x Years	14	374349.7*	730386.9**	632876.5**	1108514.9**	251892.9**	266804.6	472281.7	705488.3**
Error B	63	199147.7	189167.4	175528.5	278735.8	95339.0	461701.2	696849.3	179053.9

* significant at 5% level.
** " " 10% " .

ANALYSIS OF VARIANCE TABLE FOR AFTERMATH YIELDS

MEAN SQUARES OF LOCATIONS

		Zones and Stations							
		1 & 2		4	5		7	7	8
Variables	d.f.	Ridgetown	Guelph	Mindemoya	Kemptville	Ottawa	Ft.William	Ft.William	Kapuskasing
Replications	3	834839.9	124921.3	187933.0	429096.0	832750.7	462717.0	938958.8	435022.0*
Years	2	101199520.0**	14750124.0**	2827884.5**	85301558.0**	84763769.0**	6014486.5**	4117729.0**	3408179.5**
Error A	6	263627.3	283066.7	247105.0	261524.0	295182.7	101330.7	219617.0	67019.9
Mixtures	7	264945.7	1965478.9**	376130.1**	879465.7**	484346.3**	89480.3	428645.2**	570269.1**
Mix x Years	14	273832.6	387493.4*	127915.6	387182.0**	130107.4*	57392.7	1193800.7	545572.6**
Error B	63	218662.7	107964.0	108423.8	69778.9	57300.9	87191.0	107759.5	58724.4

* significant at 5% level
** significant at 10% level

ANALYSIS OF VARIANCE TABLES FOR SEASON TOTAL YIELDS

Mean Square of Locations

		Zones and Stations							
		1 & 2	4		5		7	7	8
Variables	d.f.	Ridgetown	Guelph	Mindemoya	Kemptville	Ottawa	Ft. William	Ft. William	Kapuskasing
Replications	3	157042.1	5226880.0	2236093.3	2446768.0	1600528.0	3714853.3	3792088.0	3659133.3
Years	2	145270900.0**	124580750.0**	22231708.0*	134400500.0**	120008520.0**	118491180.0**	138305070.0**	6897247.0*
Error A	6	476378.7	9732261.4	2063762.7	1711309.3	808672.0	396949.3	3320342.7	897752.9
Mixtures	7	1805677.7**	3399812.6**	2204301.7**	4176640.0**	922187.4**	409222.9	1213500.6	595833.7
Mixtures Years	14	942884.6*	1118249.1**	736747.9**	1785984.0	341377.1*	300352.0	359445.7	2183833.6**
Error B	63	477700.3	324105.1	367685.9	1311077.3	178545.3	636367.8	637917.7	317739.8
C.V.									

* significant at 5% level.
** significant at 10% level.

HAY GROWTH CURVE

Outline: 1960 Progress Report

Purpose: To determine the growth curve of some of our hay forage species and varieties to learn the best time to cut these crops for

1. Maximum dry matter yields of

   (a) the first crop taken at weekly intervals
   (b) the second crop taken as early hay
   (c) succeeding crops taken as pasture aftermath
   (d) total yield of dry matter.

2. Digestible dry matter through growth period of the first crop.

3. From the growth and digestibility data, to predict the yield and feed value of these hay crops on a certain date or stage of growth, plus the time interval required for the aftermath to be at a certain stage of growth and its yield.

Location: Sections B and C, Ranges 2-5.

Procedure: Establish each spring new seedings of the following:

Alfalfa	-	Vernal - 12 lbs./acre
		DuPuits - 12 lbs./acre
Brome	-	Canadian - 15 lbs./acre
		Saratoga - 15 lbs./acre
Orchard	-	Frode - 10 lbs./acre
		Ottawa 100 - 10 lbs./acre
Timothy	-	Climax - 8 lbs./acre
		Essex - 8 lbs./acre

Design: Split-split plot - 6 replications. Main plots - species; sub plots - varieties; sub-sub plots - cutting dates. Plot size - 5' x 12'; harvested 3' x 9'.

Data Collected:

1. Weekly yield of dry matter - May 8, 15, 22, 29, June 5, 12, 19, 26, July 3, 10, 17, 24, and succeeding crop yields.
2. Percent dry matter at all harvests
3. Weekly height measurements
4. Percent leaf at weekly intervals
5. Stages of growth and development at weekly intervals
6. Ground cover and vigor in fall and following spring
7. Percent digestible dry matter at weekly intervals
8. Percent crude protein at weekly intervals
9. Residual effect on yield in the succeeding hay crop

TEST 151 - HAY GROWTH CURVE - 1961

First Crop Digestibility Data

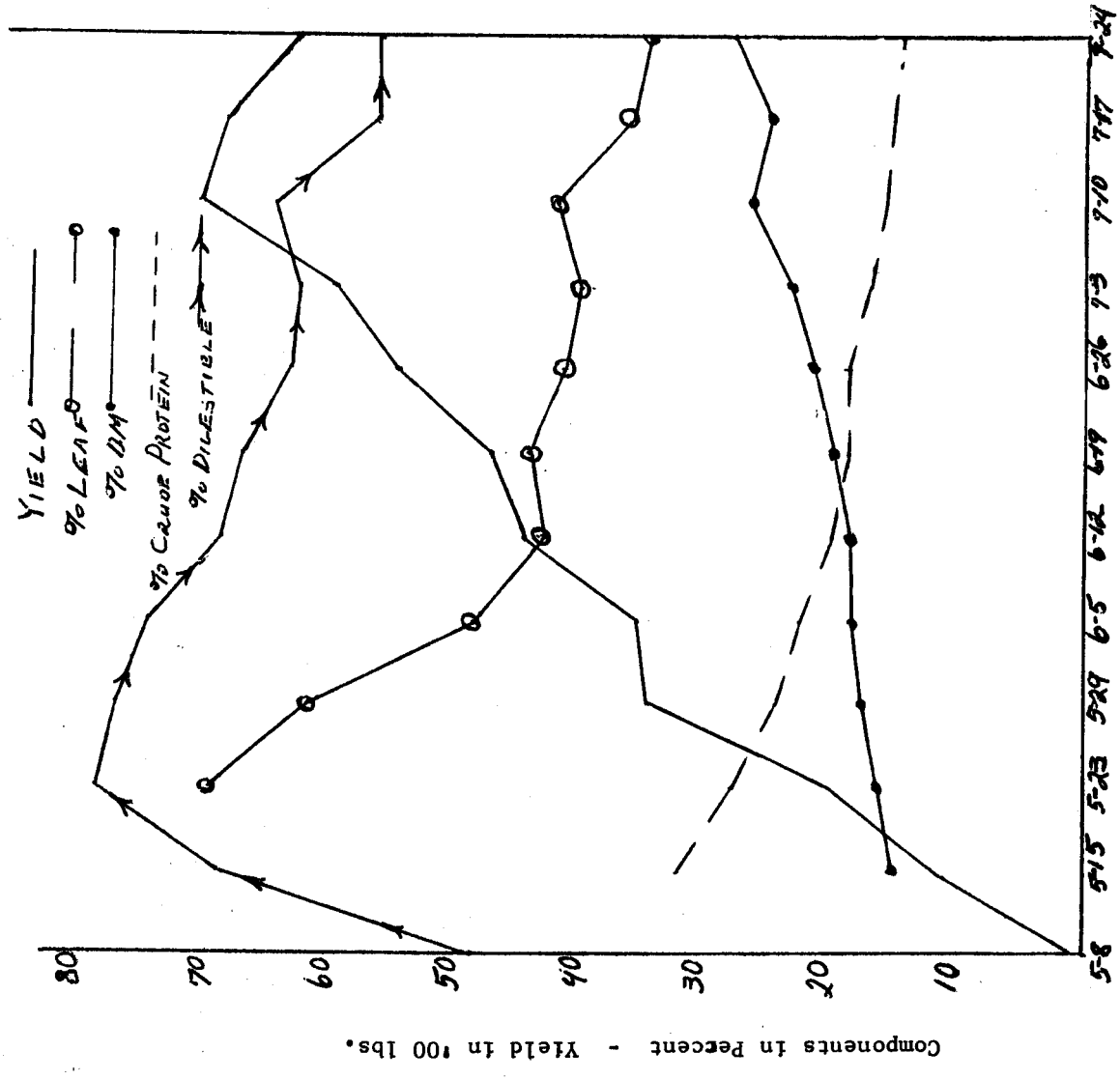
Cut No.	Date Cut	Stage Cut	Yield D.M.	% D.D.M.	Yield D.D.M.	Stage Cut	Yield D.M.	% D.D.M.	Yield D.D.M.
VERNAL						DUPUITS			
1	5-8	Veg.	86	48.8	67	Veg.	291	54.3	169
2	5-15	Veg.	1071	69.9	756	Veg.	1141	71.5	829
3	5-23	Veg.	1836	79.1	1645	Veg.	2960	75.1	1548
4	5-29	Veg.	3348	78.3	2299	E. Bud	3033	74.4	2107
5	6-5	E. Bud	3343	75.9	2655	E. Bud	3603	71.2	2628
6	6-12	Bud	4390	69.6	3001	Bud	4308	69.5	3072
7	6-19	Bud	4672	68.6	3036	Bud	4983	66.4	3388
8	6-26	Bud	5434	63.5	3308	E. F.	5780	63.4	3761
9	7-3	Full F.	5898	63.3	3643	Full F.	6240	----	----
10	7-10	Full F.	6959	65.1	3461	E. Seed	7396	63.9	4920
11	7-17	Seed	6864	57.5	4397	Seed	7758	58.3	4694
12	7-24	Seed	6350	57.5	3586	Seed	7051	54.5	4056
CLIMAX						ESSEX			
1	5-8	Veg.	292	50.7	161	Veg.	445	46.9	217
2	5-15	Veg.	762	66.5	513	Veg.	702	67.5	486
3	5-23	Veg.	1588	73.4	1232	Veg.	1549	68.6	1123
4	5-29	Veg.	2220	74.3	1553	Veg.	1659	71.8	1174
5	6-5	Joint	3401	67.6	2425	Veg.	3254	66.6	1694
6	6-12	Joint	4218	64.6	2675	Joint	3762	64.0	2293
7	6-19	Boot	4964	62.8	3000	Joint	4797	62.4	2996
8	6-26	Head	5941	----	----	Boot	5684	60.9	3337
9	7-3	Head	6480	54.4	3634	Head	6355	54.4	3480
10	7-10	Fl.	7641	51.7	3952	Head	7892	54.1	4265
11	7-17	Fl.	7793	49.0	3818	Fl.	8603	52.4	4507
12	7-24	Fl.	8184	44.9	3893	Fl.	8696	46.2	4153

TEST 151 - HAY GROWTH CURVE - 1961

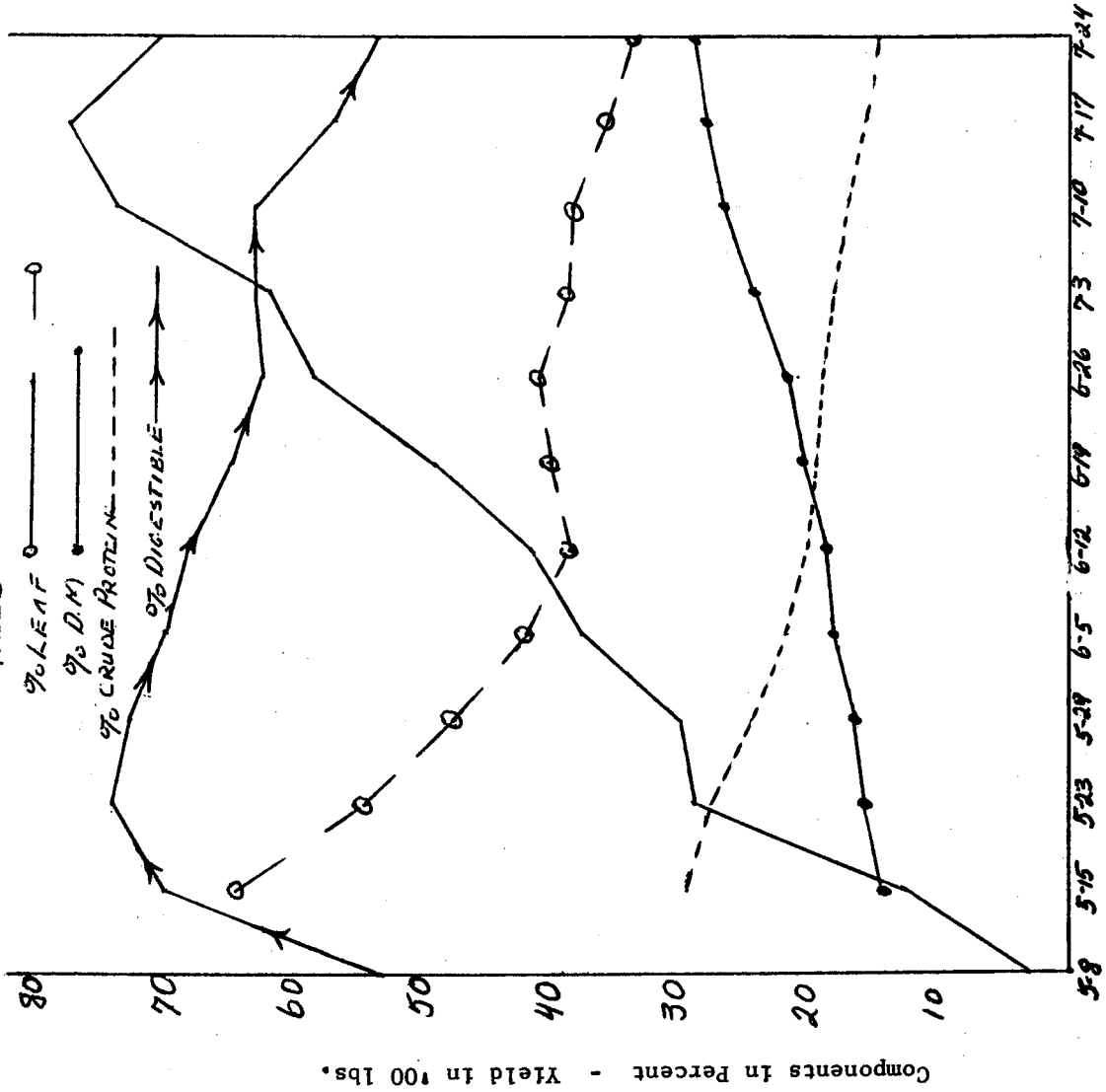
First Crop Digestibility Data

Cut No.	Date Cut	Stage Cut	Yield D.M.	% D.D.M.	Yield D.D.M.	Stage Cut	Yield D.M.	% D.D.M.	Yield D.D.M.
FRODE						OTTAWA 100			
1	5-8	Veg.	266	46.6	133	Veg.	191	37.1	61
2	5-15	Veg.	799	63.7	475	Veg.	469	60.0	274
3	5-23	Veg.	1259	69.8	845	Veg.	1184	68.6	884
4	5-29	Head	2028	67.6	1161	Veg.	1399	71.5	1032
5	6-5	Head	3218	63.8	1642	Boot	2898	64.6	2099
6	6-12	Head	3431	55.4	1992	Head	3133	64.5	1875
7	6-19	Head	3902	55.4	2303	Head	3819	60.5	2378
8	6-26	Head	4056	53.1	2296	Head	3885	59.2	2820
9	7-3	Head	4483	45.7	2219	Head	4288	53.3	2414
10	7-10	Head	4220	54.5	2377	Head	4733	55.5	2728
11	7-17	Seed	4581	48.9	2301	Seed	5171	48.1	2492
12	7-24	Seed	3998	45.1	1392	Seed	5176	43.8	1740
SARATOGA						CANADA			
1	5-8	Veg.	564	61.2	406	Veg.	522	60.1	335
2	5-15	Veg.	1311	74.9	931	Veg.	967	75.6	681
3	5-23	Veg.	2239	78.4	1809	Veg.	2069	74.0	1680
4	5-29	Veg.	3290	79.7	2960	Veg.	2535	73.2	1906
5	6-5	Boot	4167	69.6	3041	Boot	3747	72.5	2907
6	6-12	Head	4927	65.5	3272	Head	4983	69.5	3484
7	6-19	Head	5944	63.5	3827	Head	5899	63.9	3930
8	6-26	Head	6557	60.1	4083	Head	6227	63.7	4031
9	7-3	Head	6915	60.9	4427	Head	6765	60.2	4419
10	7-10	Head	8058	60.9	5112	Head	7673	60.3	4697
11	7-17	Seed	8296	58.9	4886	Seed	7616	57.2	4356
12	7-24	Seed	8313	58.2	5328	Seed	7806	57.7	4644

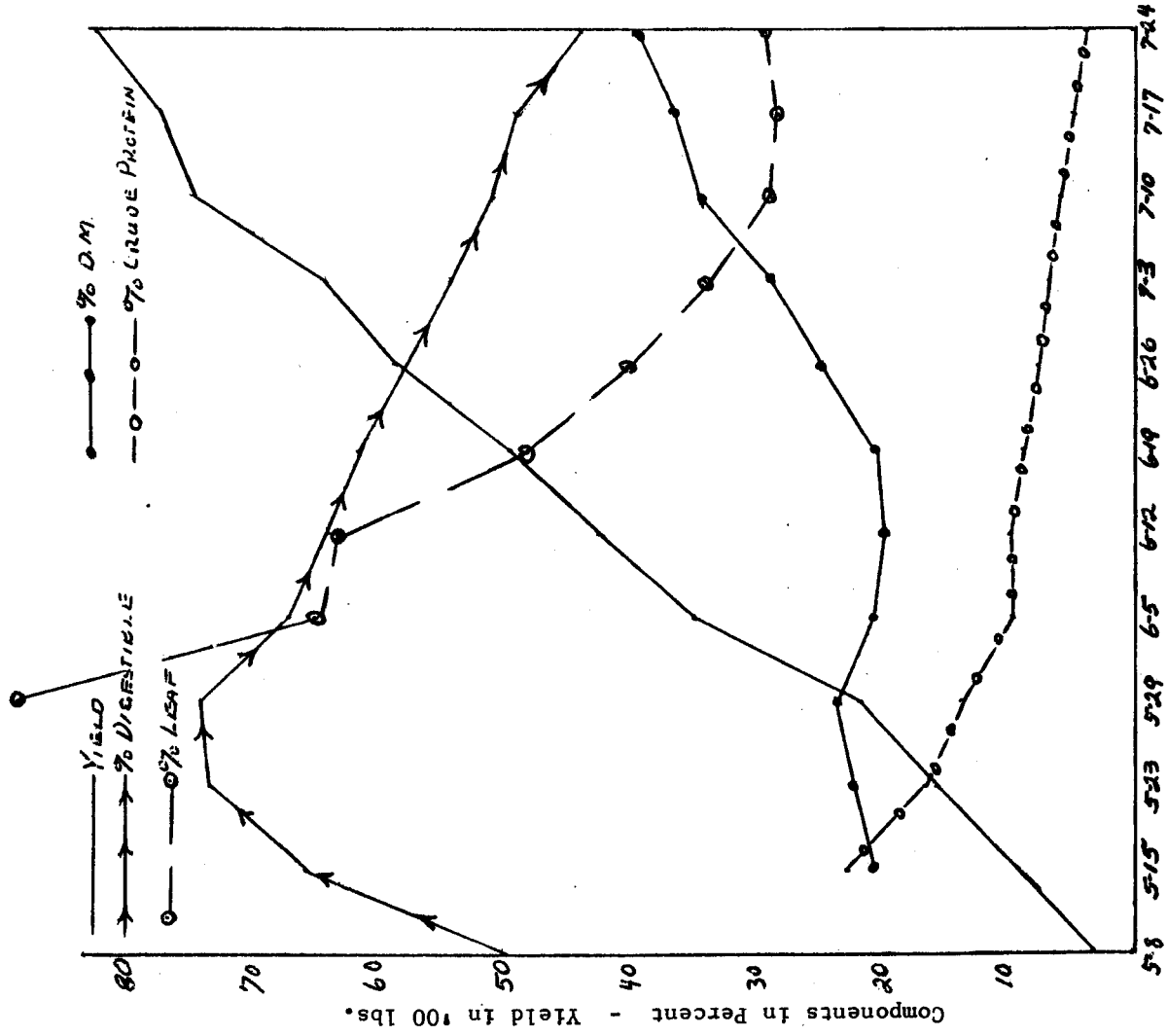
VERNAL ALFALFA - 1961



DUPUITS ALFALFA - 1961



CLIMAX TIMOTHY - 1961



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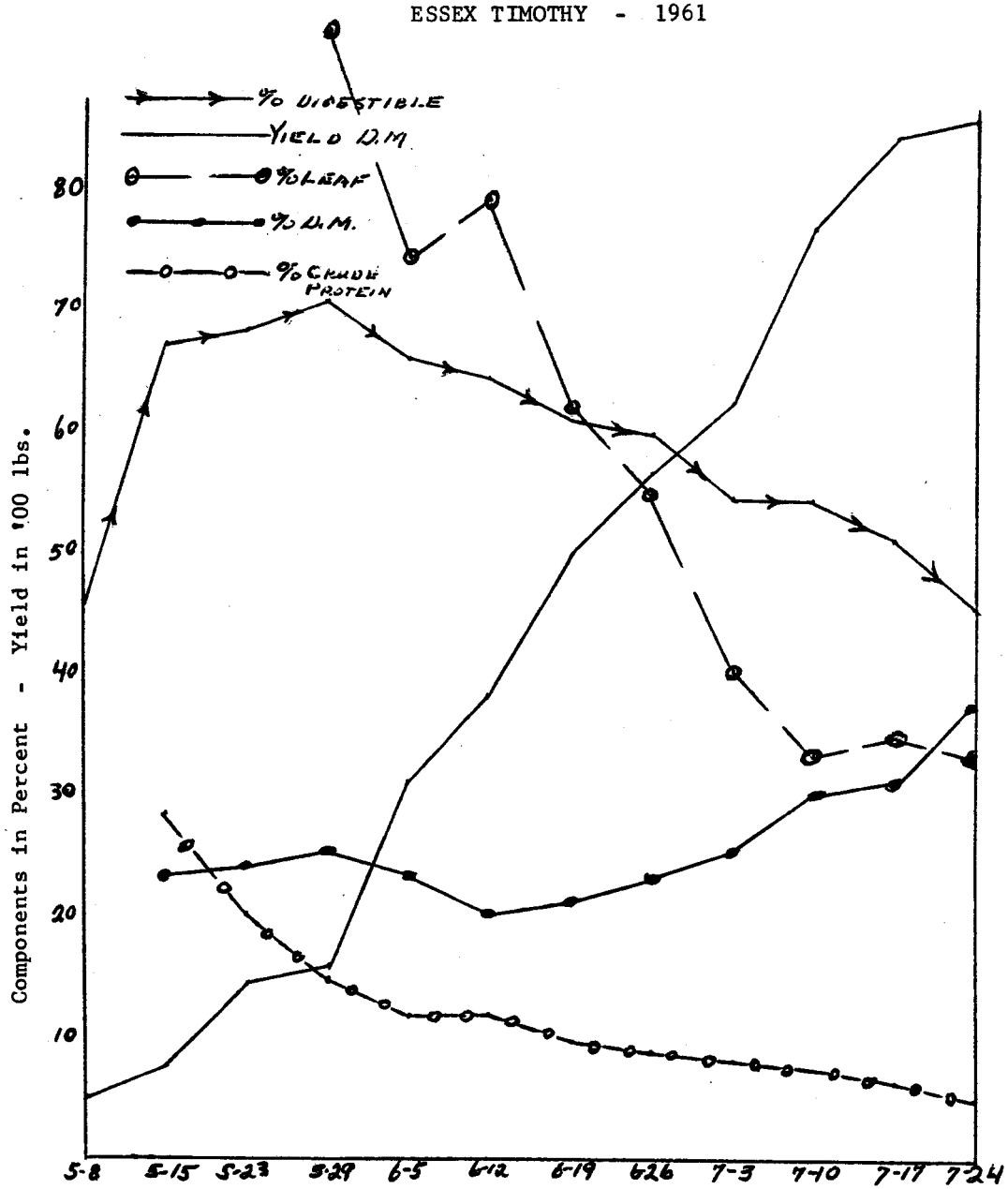
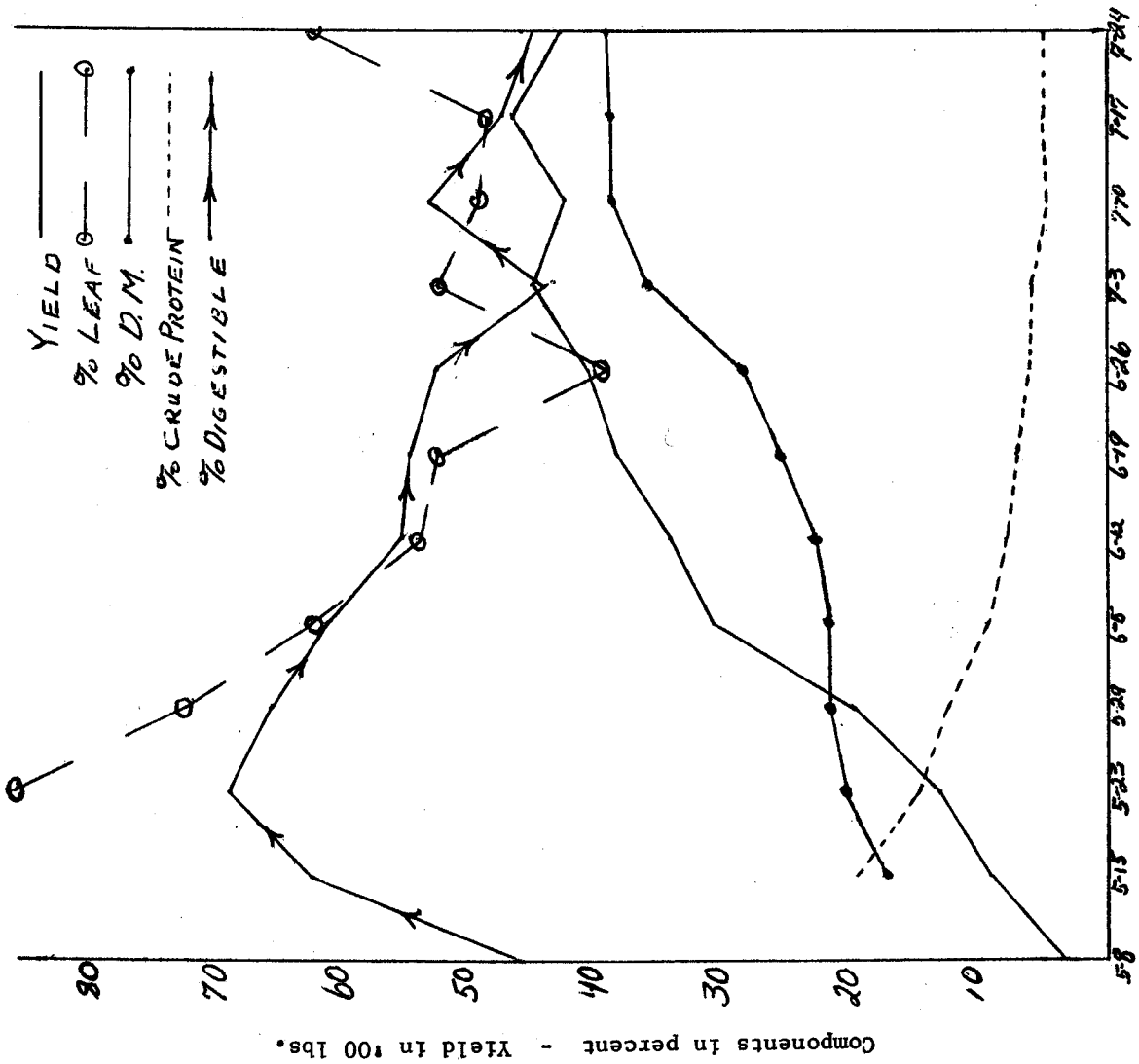
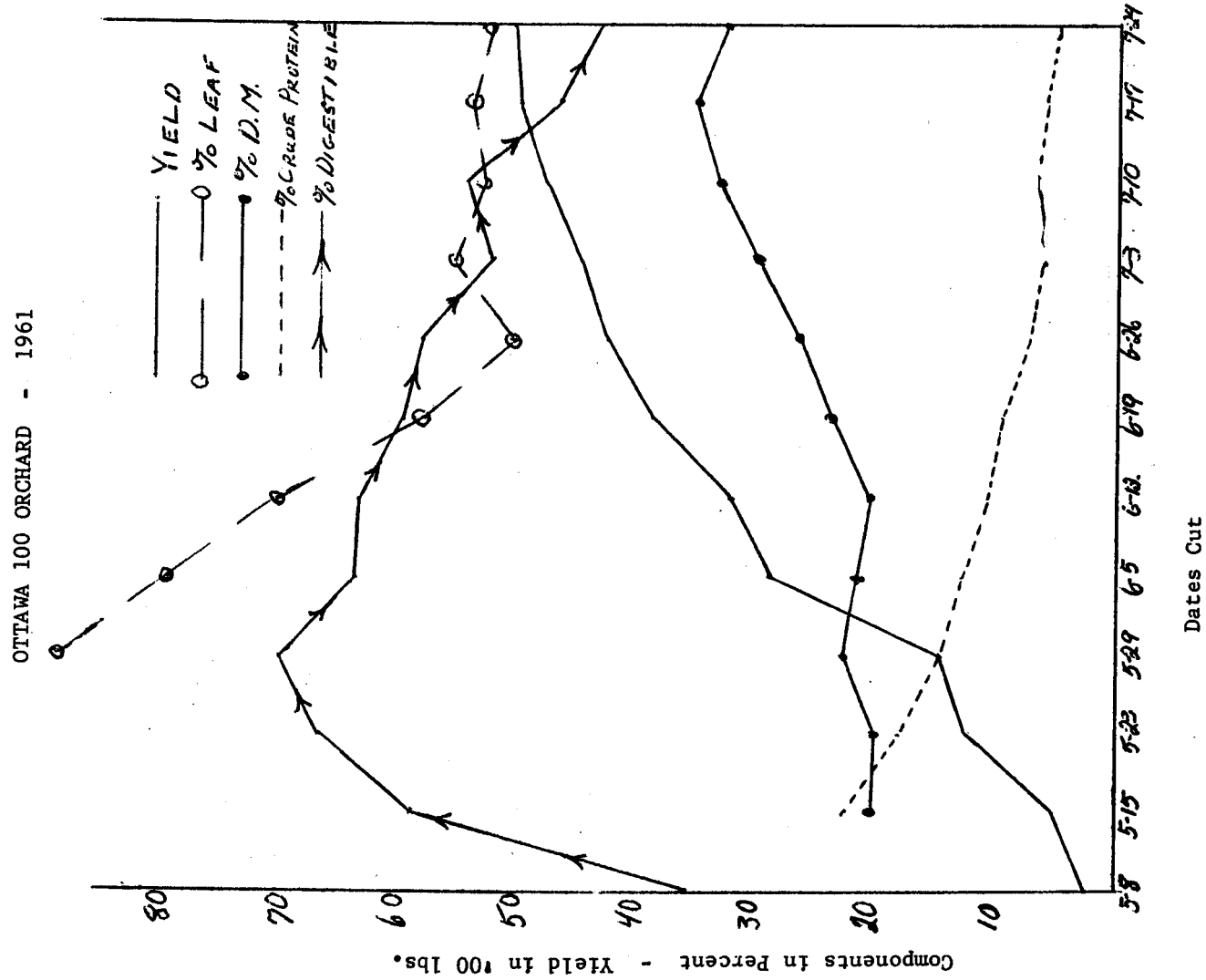
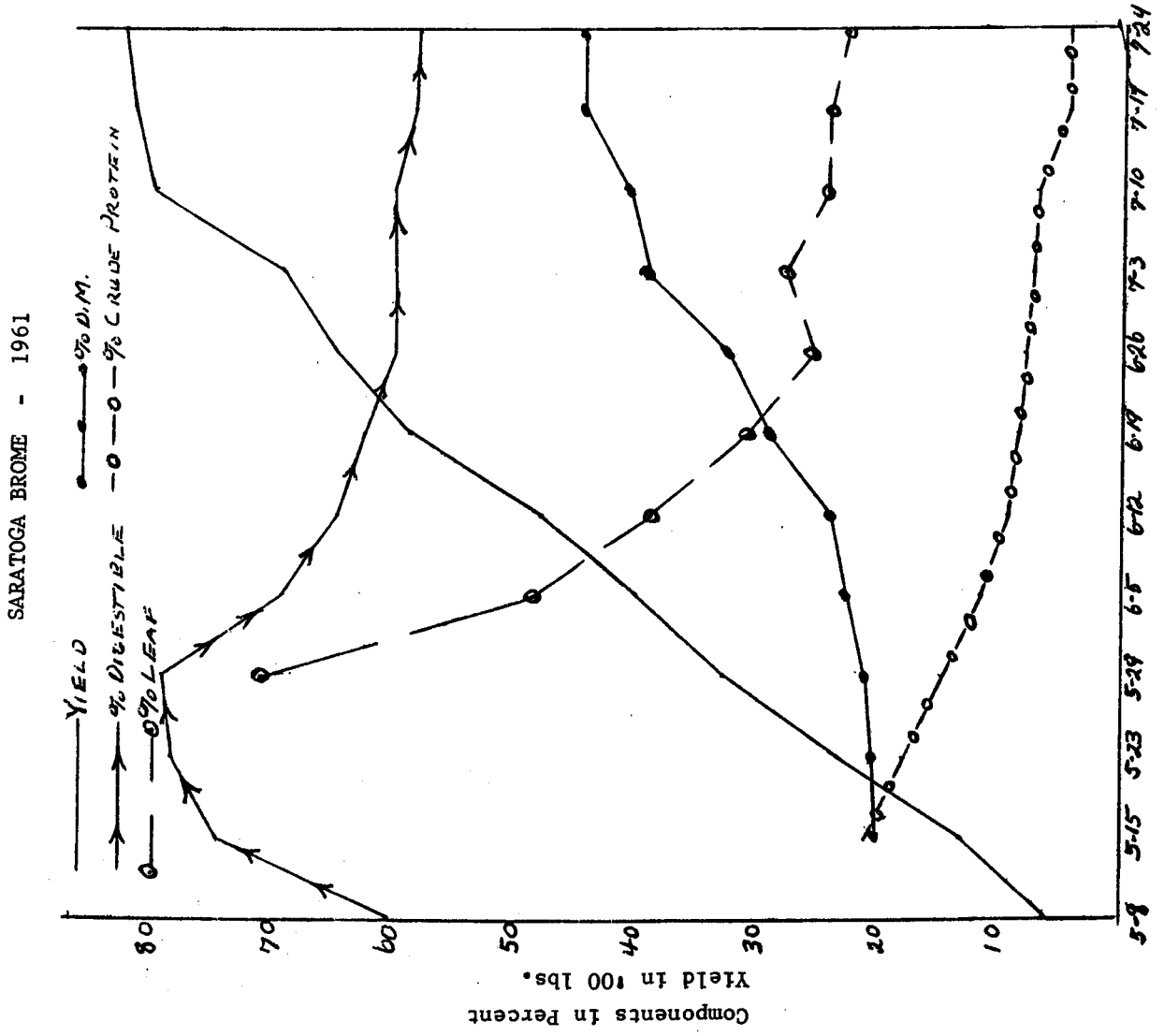
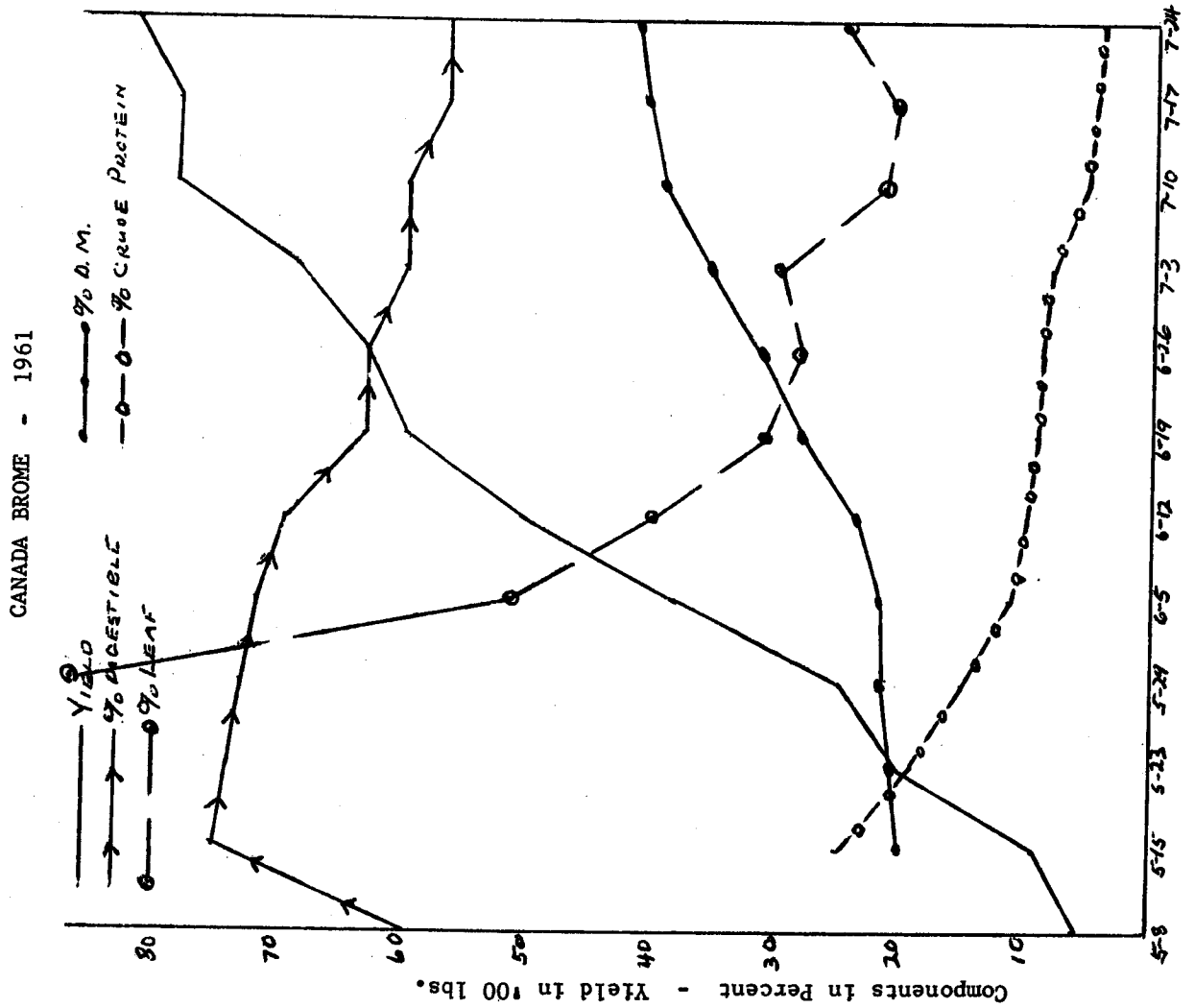


FRODE ORCHARD - 1961




OTTAWA 100 ORCHARD - 1961
YIELD
% LEAF
% D.M.
% CRUDE PROTEIN
% DIGESTIBLE
Components in Percent - Yield in 100 lbs.
80
70
60
50
40
30
20
10
5-8
5-15
5-22
5-29
6-5
6-12
6-19
6-26
7-3
7-10
7-17
7-24
Dates Cut


SARATOGA BROME - 1961
YIELD
% D.M.
% DIGESTIBLE
% CRUDE PROTEIN
% LEAF
Components in Percent
Yield in 100 lbs.
80
70
60
50
40
30
20
10
5-9
5-15
5-23
5-29
6-5
6-12
6-19
6-26
7-3
7-10
7-17
7-24
Dates Cut


CANADA BROME - 1961
Yield
% Digestible
% Leaf
% D.M.
% Crude Protein
Components in Percent - Yield in 100 lbs.
90
70
60
50
40
30
20
10
5-8
5-15
5-23
5-29
6-5
6-12
6-19
6-26
7-3
7-10
7-17
7-24
Dates Cut

TEST 151 - RESIDUAL EFFECTS IN 1962

Alfalfa - with both varieties cut 5 which was removed in early September had the highest survival, yield, fall and spring vigor indicated by height.

Brome - with both varieties cut 5 removed on September 5 and cut 12 which was cut only twice during the previous season gave the highest residual yield. They were the tallest and most vigorous in the fall and early spring.

Orchard - Varieties that were tall in the fall were also taller in mid-May, but at harvest time there were little height differences. Those present and yield differences were associated with the number of times the crop was cut in the first harvest year.

Timothy - Cuts 5 and 12 gave the highest yields and were taller in the fall and early spring. The yield did not appear to be closely associated with the time and number of cuts taken.

TEST 151 - HAY GROWTH CURVE

Residual Effect - 1962 Harvest

Cut No.	Date Last After. Cut	Height in cms. 11/7	5/11	6/12	% Stand 5/11/62	No. Cuts '61	% D.M.	Yield D.M. acre	Date Last After. Cut	Height in cms. 11/7	5/11	6/12	% Stand 5/11/62	No. Cuts '61	% D.M.	Yield D.M. Acre
	VERNAL								DUPUITS							
1	9-11	14	18	77	73	4	21.0	3877	9-11	18	23	81	67	4	22.3	4025
2	9-18	7	16	77	62	4	20.4	3606	9-18	9	20	79	45	4	22.0	3093
3	9-18	7	16	76	62	4	21.5	3661	9-18	11	18	78	48	4	21.9	3089
4	9-18	6	16	74	62	4	21.4	3611	9-18	12	18	78	42	4	22.1	2493
5	9-5	12	21	75	75	3	21.8	4154	9-5	21	22	85	80	3	22.6	4109
6	9-18	6	19	76	67	3	21.4	3945	9-18	13	22	79	47	3	22.4	3308
7	9-11	8	18	79	67	3	21.4	3907	9-11	17	23	83	58	3	22.6	4042
8	9-11	8	19	77	67	3	22.1	3914	9-11	17	23	78	53	3	22.4	3673
9	9-18	7	17	78	61	3	21.4	3979	9-18	14	22	77	53	3	22.2	3498
10	9-18	7	17	78	59	3	21.4	3739	9-18	13	18	81	43	3	22.2	3393
11	9-18	7	16	74	57	3	21.2	3791	9-18	13	19	82	51	3	22.1	3258
12	9-18	8	16	77	57	3	21.1	3484	9-18	11	20	82	52	3	22.3	3416
	SARATOGA								CANADA							
1	9-25	7	25	96	92	4	27.7	3466	9-25	6	20	84	95	4	25.3	2835
2	9-25	7	23	97	93	4	27.6	3594	9-25	7	19	79	99	4	26.9	2671
3	9-25	8	24	96	92	4	27.8	3568	9-25	7	19	78	98	4	25.2	2955
4	9-25	7	23	100	96	4	27.9	3750	9-25	7	18	79	98	4	25.3	2796
5	9-5	12	32	114	98	3	26.8	5144	9-5	10	28	94	99	3	24.6	4542
6	9-25	7	26	103	95	3	27.9	3791	9-25	7	20	84	97	3	25.6	2966
7	9-25	8	23	99	93	3	26.0	3575	9-25	8	21	83	95	3	25.6	2914
8	9-25	8	26	98	97	3	28.2	3544	9-25	8	21	83	97	3	25.3	2887
9	9-25	8	26	98	94	3	28.0	3780	9-25	8	19	84	98	3	25.3	3056
10	9-25	8	26	102	97	3	27.4	3974	9-25	7	21	80	97	3	25.2	3184
11	9-25	8	22	100	99	3	27.3	3646	9-25	7	20	83	97	3	24.6	3110
12	9-5	13	32	114	99	2	27.2	6033	9-5	10	26	99	100	2	24.7	5200

TEST 151 - HAY GROWTH CURVE

Residual Effect - 1962 Harvest

Cut No.	Date Last After. Cut	Height in cms. 11/7	5/11	6/12	% Stand 5/11/62	No. Cuts '61	% D.M.	Yield D.M. acre	Date Last After. Cut	Height in cms. 11/7	5/11	6/12	% Stand 5/11/62	No. Cuts '61	% D.M.	Yield D.M. acre
	FRODE								OTTAWA 100							
1	9-5	10	25	84	100	4	23.9	2902	9-5	11	18	45	96	4	23.0	2007
2	9-5	12	22	84	99	4	23.9	2873	9-5	11	21	46	99	4	22.9	1936
3	9-5	10	24	82	99	4	21.2	2914	9-5	11	18	48	97	4	22.5	2084
4	9-11	10	23	84	99	4	24.2	2626	9-11	10	17	42	97	4	19.8	1745
5	9-18	10	21	79	100	4	23.7	2689	9-18	9	16	46	97	4	23.2	1815
6	9-18	12	28	90	100	3	22.6	3723	9-18	12	22	55	100	3	21.5	2796
7	9-5	12	27	90	99	3	23.4	3370	9-5	13	22	52	100	3	22.4	2770
8	9-11	12	28	88	100	3	22.7	3499	9-11	12	19	51	99	3	22.1	2743
9	9-11	13	29	85	100	3	23.3	3704	9-11	12	23	51	99	3	22.2	2677
10	9-18	11	26	86	100	3	23.9	3393	9-18	11	21	55	98	3	21.4	2350
11	9-18	13	27	88	99	3	23.3	3402	9-18	11	23	50	99	3	22.0	2718
12	9-5	17	31	90	99	2	24.4	3703	9-5	15	24	54	99	2	22.5	2743
	CLIMAX								ESSEX							
1	10-2	8	22	70	97	4	23.0	3984	10-2	8	20	55	96	4	22.5	3441
2	10-2	8	22	73	96	4	22.6	4194	10-2	8	19	55	98	4	22.2	3173
3	10-2	7	22	69	97	4	22.5	3698	10-2	8	19	53	97	4	22.5	3120
4	10-2	8	23	74	98	4	22.5	4149	10-2	7	20	56	99	4	22.3	3131
5	8-28	11	28	72	99	3	22.6	4387	8-28	13	26	68	98	3	22.0	4164
6	10-2	7	22	70	97	3	22.6	4085	10-2	8	20	53	96	3	22.7	3105
7	10-2	8	22	70	96	3	22.8	3942	10-2	7	23	56	92	3	21.8	3285
8	10-2	8	22	68	98	3	23.0	3820	10-2	8	19	56	98	3	22.2	3282
9	8-28	11	30	66	98	2	23.0	4164	8-28	14	26	67	100	2	22.3	4089
10	9-5	11	28	72	99	2	23.1	4280	9-5	12	25	70	95	2	21.7	4303
11	9-5	12	28	73	98	2	23.5	4297	9-5	12	23	68	100	2	21.9	4158
12	9-5	13	28	73	98	2	22.8	4746	9-5	13	27	67	97	2	22.5	4095

TEST 151 - HAY GROWTH CURVE

Residual Effect - 1962 Hay Harvest

Variance Due To	Degrees of Freedom	Mean Squares	C.V. in % for
Reps	5	7,270,438.94	
Species	3	31,379,448.87**	28
Main plots	23	7,472,406.78	
Error a	15	2,758,320.98	
Varieties	1	52,778,405.29**	28
Varieties x Species	3	1,920,133.69	
Sub plots	47	5,181,591.29	
Error b	20	2,725,272.15	
Dates	11	4,793,475.52**	5
Dates x Species	33	2,326,314.84**	
Dates x Varieties	11	342,239.96**	
Dates x Varieties x Species	33	2,763,153.42**	
Error c	440	93,263.44	
Total	575	790,453.19	

TEST 157 - HAY GROWTH CURVE - 1962

Alfalfa

1. Dry Matter Yield - The two varieties gave similar dry matter curves with DuPuits higher throughout. Both curves started to level off once the flowering stage of growth was reached about June 18.

In 1961 the yield curves were very similar again, DuPuits was slightly higher throughout. The yield level reached in the two years was similar for Vernal, higher for DuPuits in 1961.

2. Height - DuPuits was taller than Vernal throughout the 1962 growing season. The height curve started to flatten the same time as the dry matter curves; i.e. on June 18, not on a stage basis.

1961 crop heights were similar to those in 1962, attaining about the same length of stem.

3. Percent Dry Matter - Again in 1962, the crop was cut only when dry. The dry matter percentage was lower for DuPuits until the stage when the buds emerged. The two varieties were similar after that date, both showing a marked increase in dry matter between June 25 and July 3, a late flower stage.

In 1961, the curves were very similar but came together sooner. The varieties were higher in percent dry matter in 1962.

4. Percent Crude Protein - In general the two varieties were the same in protein content, Vernal being slightly higher during the bud to full bloom stage.

In 1961, both varieties were identical throughout in protein content on any date. The crude protein content ranged from approximately 33 to 14 percent both years.

5. Percent Digestible Dry Matter - The two varieties gave similar shaped curves with Vernal slightly higher in digestibility on a date basis, particularly in the bud to early flower stages. With Vernal, this early flower stage gave 1500 to 2000 lbs. more dry matter than the bud or late bud stage with a reduction of only 3% in D.D.M. below the late bud and still well over 60% D.D.M. content.

In 1961, the two varieties were also similar on any date and at the bud to bloom stages. Again the early flower stages gave high digestibilities and marked increases in yield over the bud stages of growth.

In general, the curves of the percent protein, leaf, digestibility and dry matter were very similar in 1961 and in 1962, with all shapes changing on the same date.

6. Leaf - Vernal alfalfa had a higher percentage and a higher yield of leaves at any date or at any similar stage than DuPuits. Both varieties had their maximum yield of leaf at full bloom after which more leaves were lost than were formed. The leaf percentage hit a plateau with both varieties from the late bud to late bloom stages. The stems increased in yield throughout the season.

In 1961, Vernal was also higher in percent leaf than DuPuits but similar in yield at any date or stage. Again, both varieties decreased very little in percent leaf during bud to the flower stages of development.

TEST 157 - HAY GROWTH CURVES - 1962

First Crop Data (Yield lbs./acre)

Cut No.	Date Cut	Stage Cut	Height cms.	% D.M.	Yield D.M.	Weekly Increase D.M.	% Leaf	Yield Leaf	Weekly Increase Leaf	Yield Stem	% Crude Protein	Yield Crude Protein	% Digestible Dry Matter	Yield Digestible Dry Matter
VERNAL														
1	5-7	Veg.	17	21.8	279	----	----	----	----	----	32.3	89	74.8	206
2	5-14	Veg.	20	19.6	519	240	----	----	----	----	29.9	187	75.3	445
3	5-22	Early Bud	38	20.4	1748	1229	55.3	967	----	781	23.9	420	75.0	1341
4	5-28	Early Bud	51	20.2	2307	559	56.3	1299	332	1008	22.9	521	76.4	1646
5	6-4	Buds Em.	62	21.7	3442	1135	49.8	1714	415	1728	21.8	750	71.2	2582
6	6-11	Late Bud	75	21.3	4171	729	46.8	1952	238	2219	20.3	839	65.8	2628
7	6-18	Early Fl.	93	21.3	5486	1315	45.4	2491	539	2995	19.2	1053	63.2	3518
8	6-25	Full Fl.	101	22.5	5615	129	44.0	2471	- 20	3144	18.2	1022	62.0	3523
9	7-3	Late Fl.	96	26.0	6222	607	38.0	2364	-107	3858	16.3	1018	57.8	3463
10	7-9	E. Seed	101	27.2	6806	584	36.7	2498	134	4308	16.8	1139	60.6	4345
11	7-16	E. Seed	106	28.2	6356	-450	33.2	2110	-388	4246	14.8	939	59.9	3706
12	7-23	E. Seed	98	30.4	6471	115	31.4	2032	- 78	4439	14.4	935	57.4	3721
DUPUITS														
1	5-7	Veg.	25	15.9	817	----	----	----	----	----	34.1	277	74.3	588
2	5-14	Veg.	33	16.0	1344	527	----	----	----	----	31.5	423	80.2	1131
3	5-22	Buds Em.	54	17.3	2635	1291	48.3	1273	----	1362	24.2	637	73.9	1972
4	5-28	Buds Em.	65	19.6	3270	635	48.5	1586	313	1684	21.8	711	73.0	2348
5	6-4	Late Bud	76	21.1	3936	666	43.4	1708	122	2228	20.0	784	69.7	2692
6	6-11	Early Fl.	88	21.5	4555	619	41.1	1872	164	2683	18.5	844	65.2	2991
7	6-18	Full Fl.	102	22.4	5819	1264	41.7	2426	554	3393	17.4	1014	63.6	3712
8	6-25	Late Fl.	107	22.1	5592	-227	41.1	2298	-128	3294	17.4	971	60.0	3317
9	7-3	Late Fl.	107	27.2	6460	868	33.2	2145	-153	4315	17.0	1103	60.5	3829
10	7-9	E. Seed	105	28.9	7174	714	34.3	2461	316	4713	15.8	1132	60.0	4241
11	7-16	E. Seed	108	28.6	5878	-1296	32.7	1922	-539	3956	14.1	843	59.3	4439
12	7-23	E. Seed	111	29.2	6531	653	24.5	1600	-322	4931	13.9	860	55.6	3758

TEST 157 - HAY GROWTH CURVES - 1962

Height Yellowing Lower Leaves of Alfalfa (cms.)

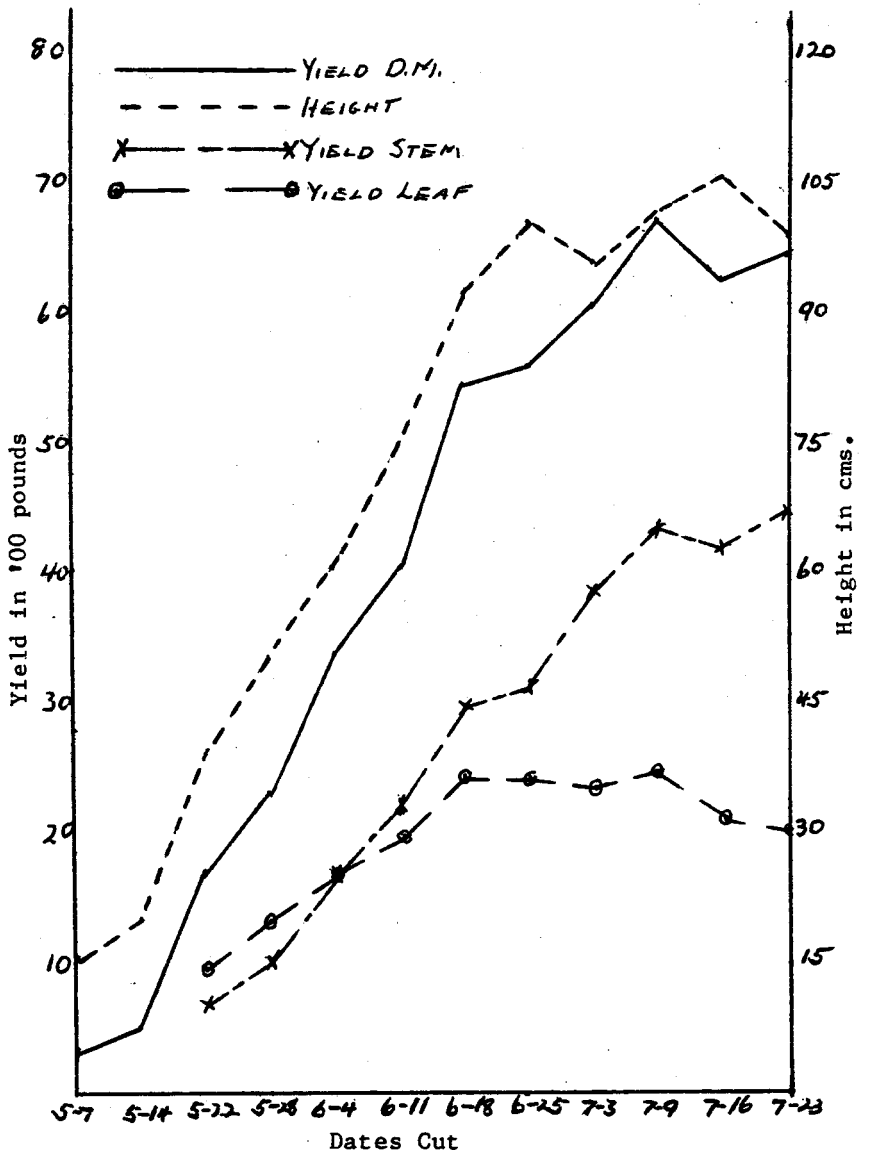
Variety	Date	Total Height	Leaf Height
Vernal	5-22	38	12
DuPuits		54	20
Vernal	5-28	51	14
DuPuits		65	24
Vernal	6-4	62	21
DuPuits		76	29
Vernal	6-11	75	27
DuPuits		88	36
Vernal	6-18	93	31
DuPuits		102	40
Vernal	6-25	101	52
DuPuits		107	57
Vernal	7-3	96	51
DuPuits		107	62
Vernal	7-9	101	58
DuPuits		105	61
Vernal	7-16	106	61
DuPuits		108	67
Vernal	7-24	98	72
DuPuits		111	84

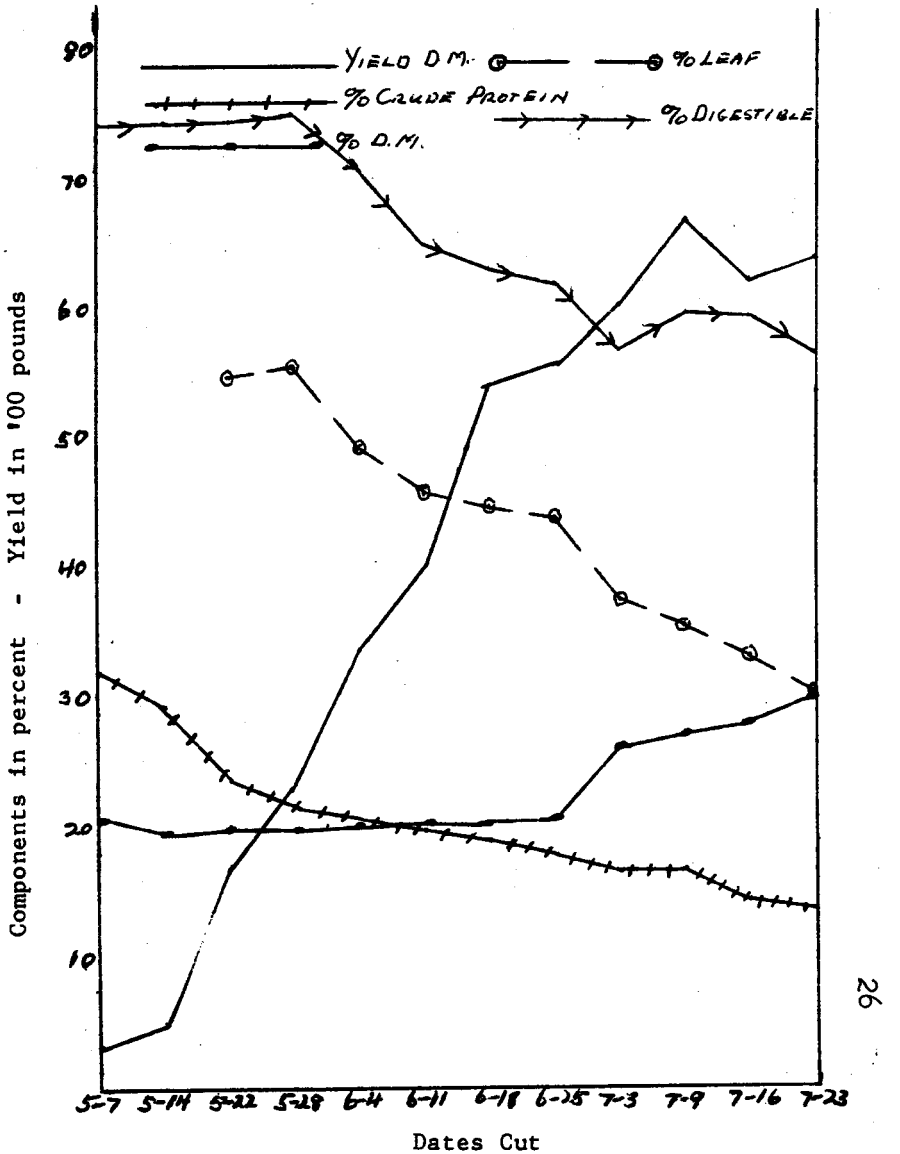
TEST 157 - HAY GROWTH CURVES - 1962

Brown Leaves inSaratoga Brome

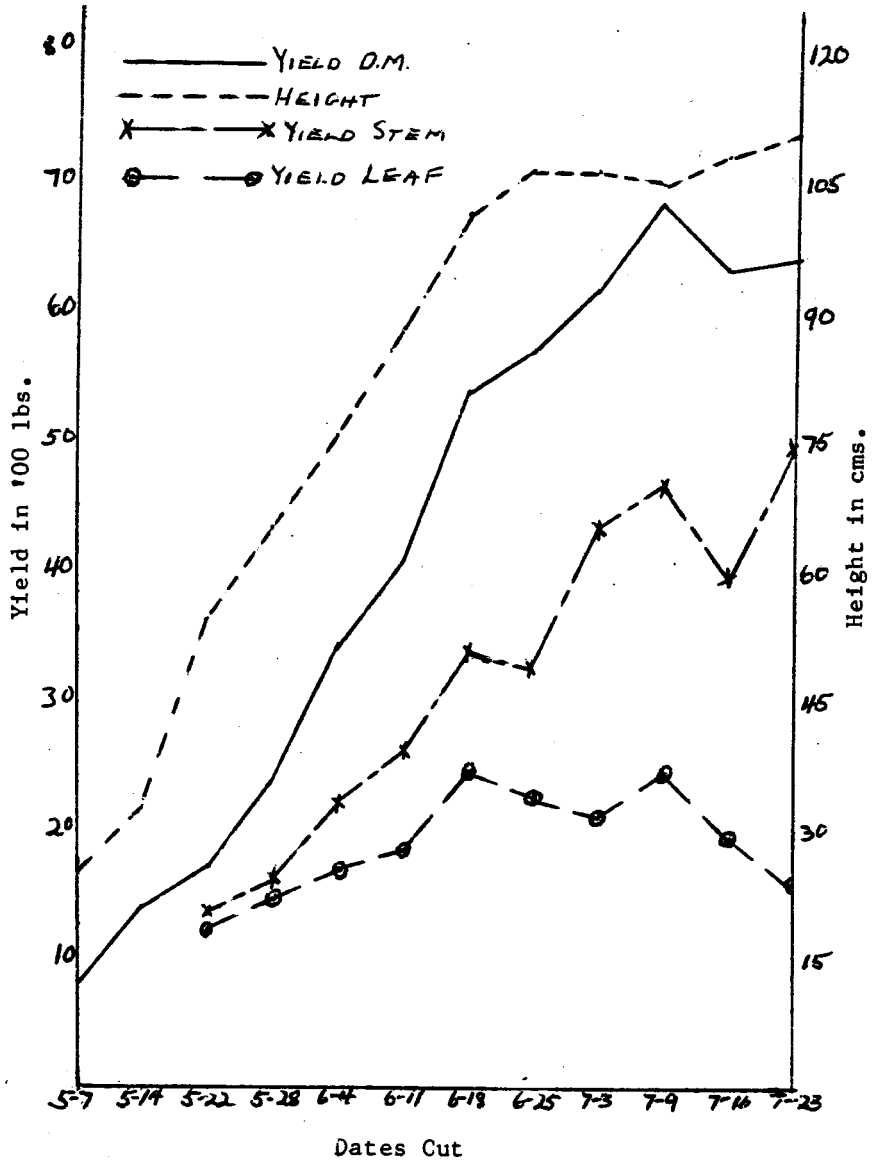
Cut No.	Date	Stage	Height	Percent of Total Plant Weight Green	Brown	Percent of Total Leaf Weight - Brown
7	6-18	Head	134	20.6	8.7	28.1
9	7-3	E. Seed	129	18.1	8.5	34.1

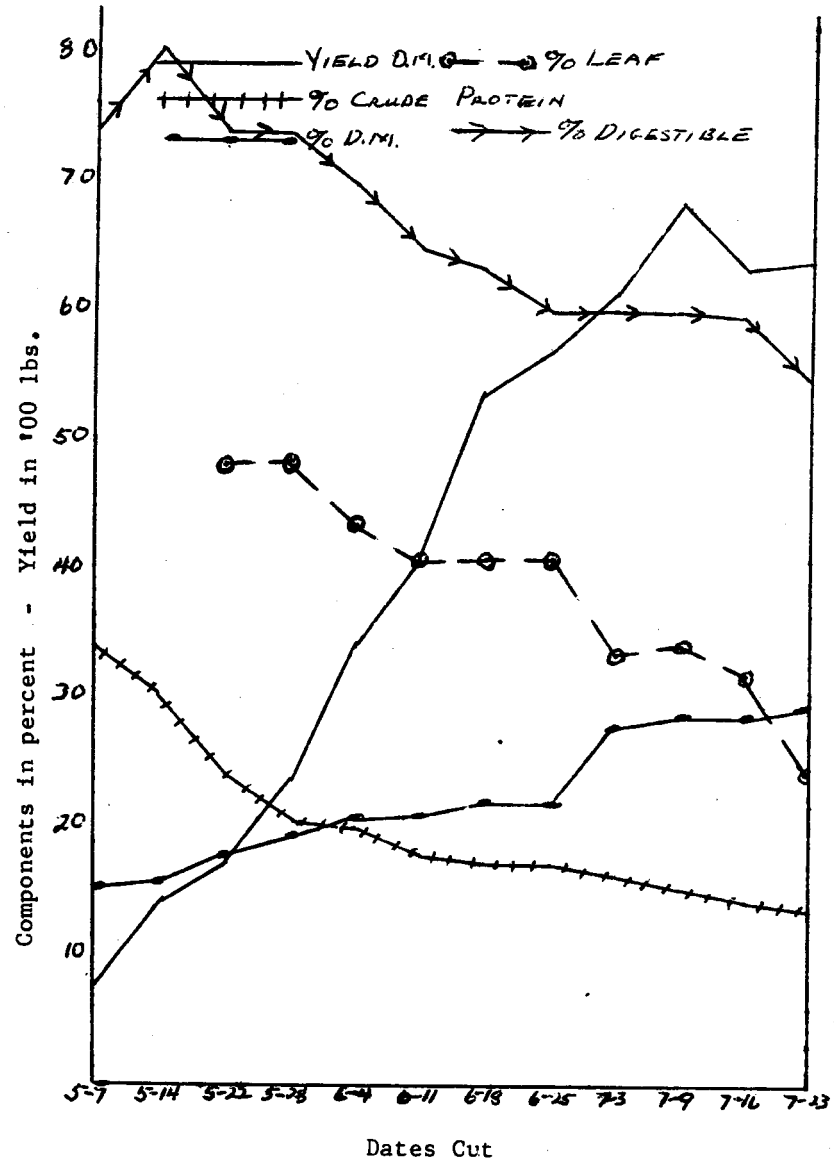
VERNAL ALFALFA - 1962





DUPUITS ALFALFA - 1962





TEST 157 - GROWTH CURVES - 1962

Aftermath Yields (Lbs./A.)

First Cut			Aftermath Harvest Dates																
No.	Date	Yield	6-18	6-25	7-3	7-9	7-16	7-24	7-31	8-8	8-13	8-20	8-28	9-4	9-12	9-18	9-24	10-4	Afterm. Total	Total Yield
Vernal																				
1	5-7	279		3719						2805							1610		8134	8413
2	5-14	519		3598						2753							1793		8144	8663
3	5-22	1748			2568								2731						5299	7047
4	5-28	2307				3001								2746					5746	8054
5	6-4	3442				2198								2427					4625	8067
6	6-11	4171					2243								2292				4535	8706
7	6-18	5486						2721								2168			4889	10375
8	6-25	5615							2753							1996			4749	10364
9	7-3	6222									2896						1388		4284	10506
10	7-9	6806											3315					614	3929	10735
11	7-16	6356												3354				350	3704	10060
12	7-24	6471													2782				2782	9253
Dubuits																				
1	5-7	817		3446						3051							1870		8367	9184
2	5-14	1344		3657						3017							2099		8773	10117
3	5-22	2635			2938								2662					1003	6603	9238
4	5-28	3270				3457								2854				576	6887	10157
5	6-4	3936				2842								2958					5800	9736
6	6-11	4555					2680								2238				4918	9473
7	6-18	5819						3101								2501			5602	11421
8	6-25	5592							3086							2333			5419	11011
9	7-3	6460									3316						1645		4961	11421
10	7-9	7174											3570					1197	4767	11941
11	7-16	5878												3474				898	4372	10250
12	7-24	6531													3069				3069	9600

TEST 157 - HAY GROWTH CURVES - 1962

Heights and Stages - Alfalfa

Cut No.	Date	Yield	Ht.	Stg.	5-14	5-22	5-28	6-4	6-11	6-18	6-25	7-3	7-9	7-16	7-23	7-30	8-8	8-16	8-20	8-28	9-4	9-12	9-24	10-3	10-29
First Growth																									
Vernal																									
1	5-7	279	17	A	10 A	20 A	26 A	43 B	53 C	67 D	75 E	10 A	21 A	34 B	42 C	46 C	48 D	10 A	14 A	23 A	30 B	35 C	35 C		7 A
2	5-14	519	20	A		14 A	20 A	36 B	52 C	65 D	73 E	9 A	20 A	31 B	44 C	47 C	49 D	11 A	16 A	24 A	34 B	37 C	37 C		7 A
3	5-22	1748	38	B			0	11 A	24 A	39 B	52 C	59 D	6 A	15 A	30 B	35 B	38 C	45 C	47 D	49 D	8 A	15 A			17 A
4	5-28	2307	51	B				6 A	17 A	31 A	45 B	52 C	56 D	7 A	26 A	29 B	39 B	43 C	44 C	45 D	46 D	7 A			16 A
5	6-4	3442	62	C					5 A	19 A	35 B	46 B	50 C	8 A	17 A	25 A	33 B	39 B	39 C	40 C	43 D	6 A			13 A
6	6-11	4171	75	D						6 A	20 A	35 B	44 C	51 D	8 A	20 A	30 B	38 B	40 B	41 C	43 D	44 D			14 A
7	6-18	5486	93	E							7 A	28 A	36 B	48 C	54 D	7 A	21 A	31 B	35 B	39 D	42 D	45 D			8 A
8	6-25	5615	101	G								12 A	27 A	41 C	50 D	54 D	11 A	24 B	29 B	36 B	40 C	44 D			9 A
9	7-3	6222	96	G									9 A	21 A	40 C	44 C	50 D	55 D	7 A	16 A	25 A	30 B	31 B		6 A
10	7-9	6806	101	H										12 A	28 B	40 C	48 C	54 C	55 D	59 D	10 A	16 A		21 A	9 A
11	7-16	6356	106	H											12 A	24 A	42 C	49 C	51 C	56 D	61 D	7 A		13 A	11 A
12	7-23	6471	98	H												9 A	26 B	40 B	45 B	50 C	54 D	57 D			14 A
DuPuits																									
1	5-7	817	25	A	0	17 A	27 A	42 B	59 C	68 D	79 E	13 A	31 B	43 C	60 D	62 D	55 E	13 A	21 A	32 B	38 C	40 C	40 D		12 A
2	5-14	1344	33	A		13 A	23 A	42 B	60 C	71 C	82 E	13 A	29 B	44 C	51 D	53 D	56 E	15 A	23 A	34 B	38 C	44 D	44 D		12 A
3	5-22	2635	54	C			0	13 A	32 B	48 B	64 C	72 D	7 A	21 A	37 B	43 C	48 C	51 C	52 D	54 D	9 A	17 A		27 A	7 A
4	5-28	3270	65	C				6 A	22 A	40 B	40 C	64 D	68 D	10 A	31 B	40 B	46 C	49 C	50 D	51 D	51 E	8 A		20 A	8 A
5	6-4	3936	76	D					9 A	29 A	46 B	60 C	64 D	7 A	28 B	41 B	49 C	52 C	54 C	54 D	56 E	8 A			24 A
6	6-11	4555	88	E						11 A	31 A	48 C	60 C	64 D	10 A	25 B	42 B	46 C	49 C	49 D	50 D	51 D			25 A
7	6-18	5819	102	F							16 A	39 B	52 C	57 D	62 E	9 A	28 B	42 B	45 C	49 C	51 D	56 D			17 A
8	6-25	5592	107	G								19 A	36 B	53 C	60 D	62 D	14 A	31 B	37 B	43 C	49 D	52 D			18 A
9	7-3	6460	107	G									11 A	31 C	47 D	57 D	61 E	65 E	10 A	25 A	38 B	42 C	42 D		10 A
10	7-9	7174	105	H										14 A	36 B	48 C	60 D	63 D	65 D	67 E	11 A	22 A		32 B	8 A
11	7-16	5878	108	H											15 A	30 B	49 C	54 C	58 C	61 D	66 E	8 A		25 A	8 A
12	7-23	6531	111	H												11 A	34 B	47 C	50 C	56 D	60 D	65 D			28 A

Timothy

1. Dry Matter Yield - The two varieties gave similar growth curves with Essex yielding approximately 500 pounds less although ending at the same level. Climax curve started to flatten a week before Essex but this occurred when both were at the same stage of growth.

In 1961 the yields and curves were almost identical throughout.

2. Height - Essex was shorter throughout than Climax, but both were similar when the same stages are compared.

In 1961 the height was taken to the flag leaf with Climax taller from jointing to heading after which they were similar. However, at the same stage of growth, the varieties were the same height.

3. Percent Dry Matter - Essex was higher in dry matter percentage until the late joint to boot stage, after which Climax was higher in dry matter. The variety curves in 1962 were identical in shape.

In 1961, the varieties appear to have performed the same as in 1962 with the dry matter percentages crossing at the joint stage.

4. Percent Crude Protein - The protein content of the two varieties gave curves which were very similar throughout on all dates.

In 1961, Essex was 2-4% higher until the jointing stage, after which the two varieties were similar on any date.

5. Percent Digestible Dry Matter - On any date, Essex was higher in digestibility than Climax in 1962, with the exception of June 4, when they were similar. Up until that date, Essex was 4-5% higher and this difference widened 7-8% and was 5% at the time of the last cut.

In 1961, the two varieties were very similar with Climax being slightly higher in the late vegetative stage. Essex was 2-3% higher than Climax for the last few cuts. They were similar, however, at the same stage of growth.

6. Leaf - Essex was higher at any date in percent leaf than Climax, but these differences narrowed as the flowering stage approached. At the same stages of growth, however, these data were similar as were leaf and stem yields.

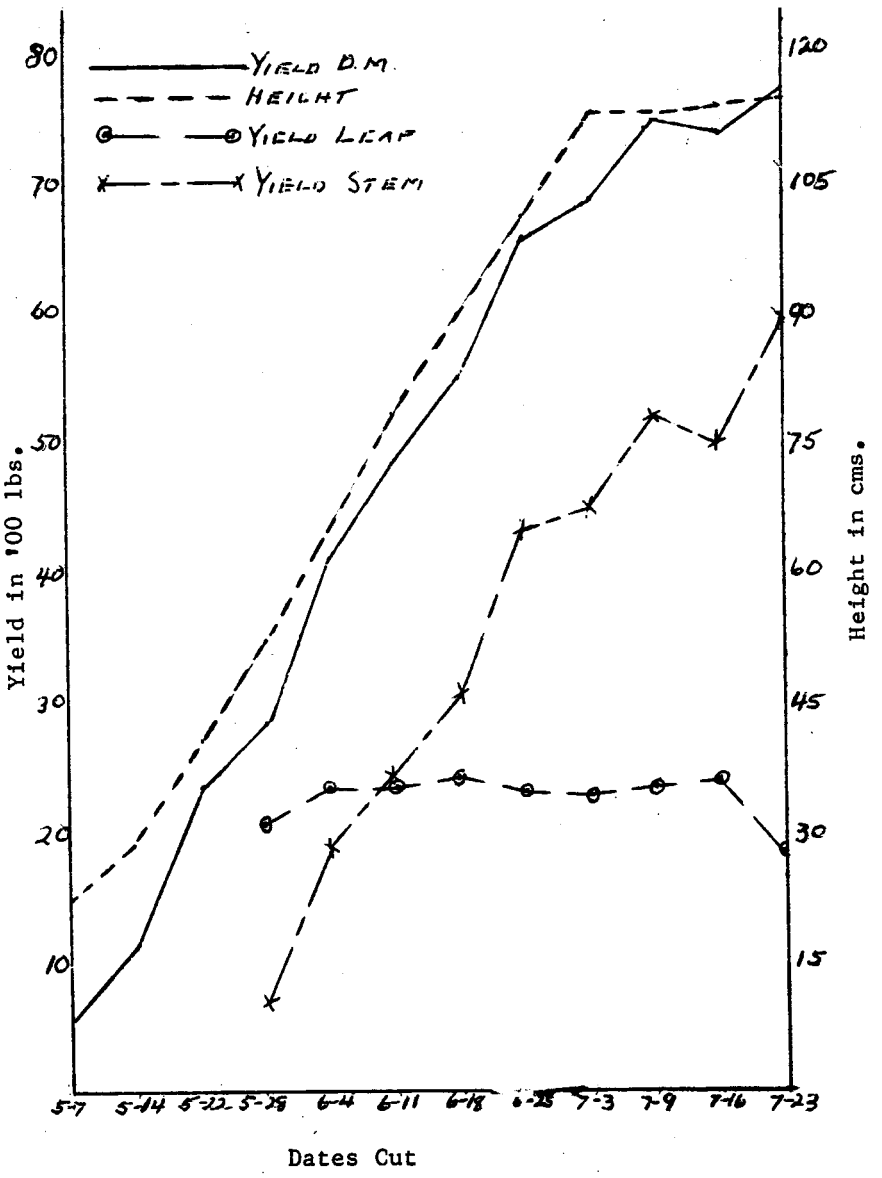
In 1961, Essex was higher in percent leaf than Climax at any date, but performed similar as in 1962 with the same stages of growth giving similar percent leaf and leaf yield.

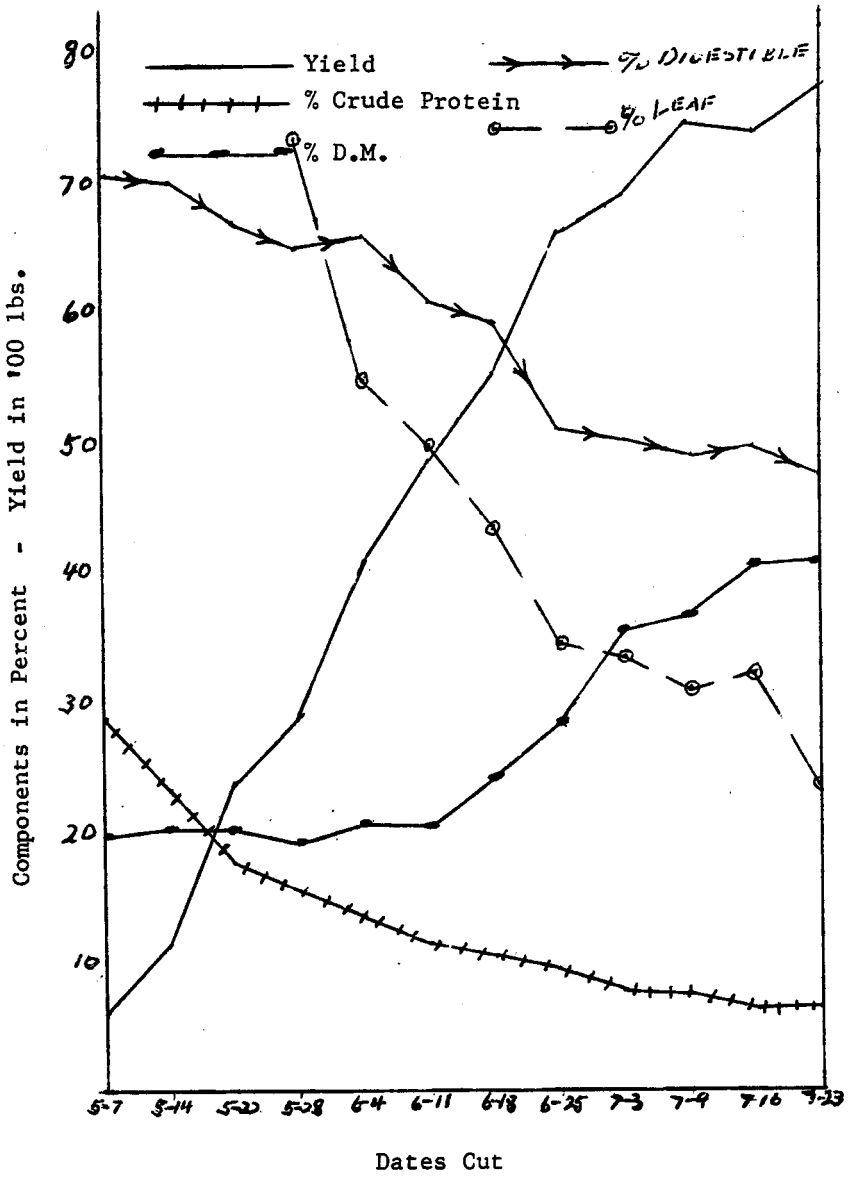
TEST 157 - HAY GROWTH CURVES - 1962

First Crop Data (Yield lbs/acre)

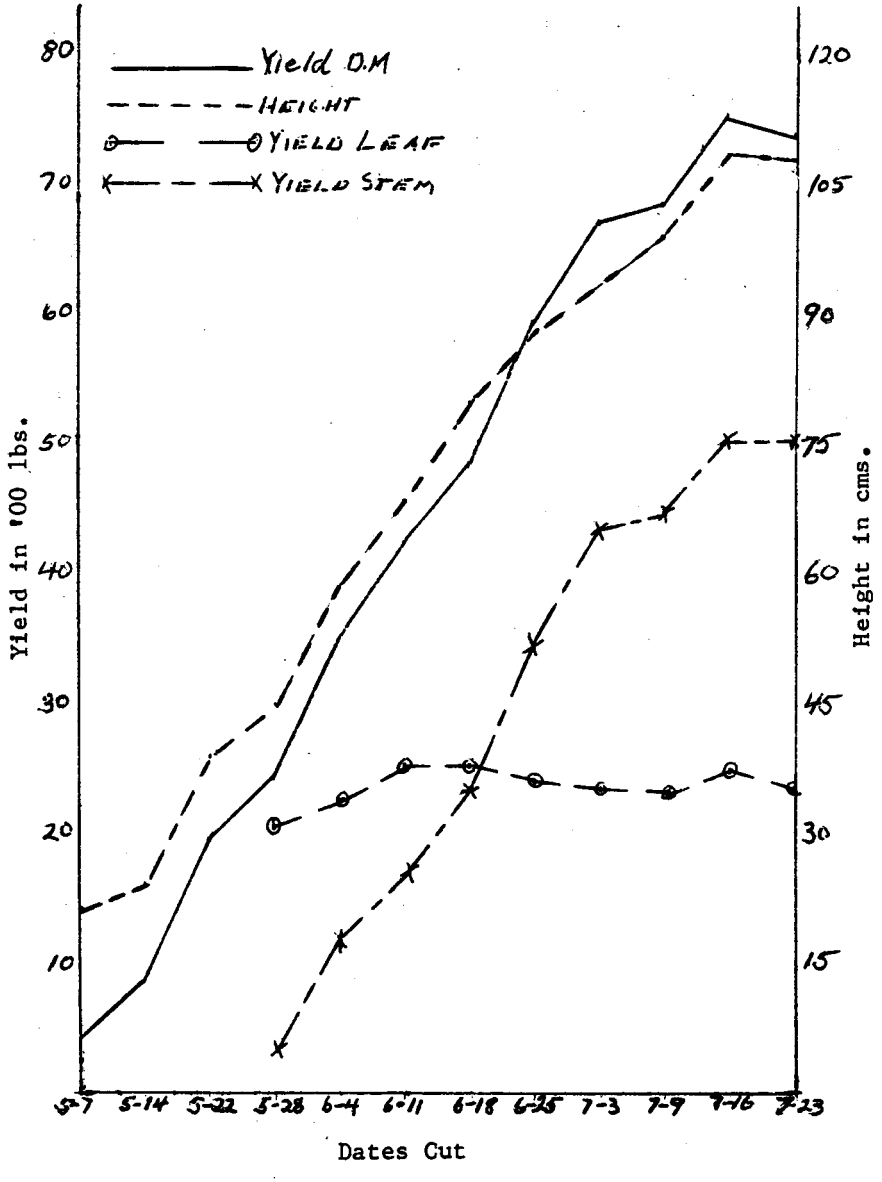
Cut No.	Date Cut	Stage Cut	Height cms.	% D.M.	Yield D.M.	Weekly Increase D.M.	% Leaf	Yield Leaf	Weekly Increase Leaf	Yield Stem	% Crude Protein	Yield Crude Protein	% Digestible Dry Matter	Yield Digestible Dry Matter
CLIMAX														
1	5-7	Veg.	23	19.9	599	----	----	----	----	----	28.7	172	71.9	443
2	5-14	Veg.	28	20.5	1175	576	----	----	----	----	23.2	275	70.4	863
3	5-22	Veg.	41	20.2	2385	1210	----	----	----	----	17.9	437	67.0	1519
4	5-28	Joint	53	18.7	2878	493	73.7	2121	----	757	15.9	461	65.6	1919
5	6-4	Boot	70	21.7	4283	1405	55.8	2390	269	1893	13.4	571	66.7	2964
6	6-11	Boot	78	20.2	4820	537	49.2	2371	- 19	2449	11.4	514	61.8	3191
7	6-18	Head	90	24.9	5589	769	43.5	2431	60	3158	10.2	569	58.1	3420
8	6-25	Head	102	28.0	6631	1042	34.9	2314	-117	4317	9.3	619	52.5	3643
9	7-3	Flower	113	36.4	6890	259	33.3	2294	- 20	4596	7.8	538	50.0	3578
10	7-9	Flower	113	37.7	7579	689	31.0	2349	55	5230	7.0	520	48.3	3771
11	7-16	Seed	114	41.8	7440	-139	32.5	2418	69	5022	6.5	483	49.5	3779
12	7-23	Seed	115	41.7	7752	312	23.5	1821	-597	5931	6.7	513	47.6	3824
ESSEX														
1	5-7	Veg.	.22	20.9	485	----	----	----	----	----	30.7	149	74.3	343
2	5-14	Veg.	24	22.1	808	323	----	----	----	----	23.9	193	73.6	633
3	5-22	Veg.	38	22.2	1929	1121	----	----	----	----	18.7	360	70.3	1433
4	5-28	Joint	45	22.6	2455	526	87.7	2153	----	302	15.6	383	70.9	1792
5	6-4	Joint	58	22.3	3523	1068	64.9	2286	133	1237	14.6	518	66.2	2538
6	6-11	Joint	68	20.9	4291	768	59.5	2553	267	1738	12.9	558	64.4	2922
7	6-18	Boot	80	22.1	4813	522	52.1	2508	- 45	2305	10.8	522	64.5	3327
8	6-25	Head	87	25.1	5941	1128	41.2	2448	- 60	3493	10.1	598	58.4	3482
9	7-3	Head	101	31.1	6734	793	35.3	2377	- 71	4357	8.5	570	56.1	3742
10	7-9	Flower	99	34.3	6803	69	34.4	2340	- 37	4463	7.7	526	54.0	4033
11	7-16	Flower	108	38.5	7654	851	33.4	2556	216	5098	6.7	508	55.3	4411
12	7-23	Seed	107	38.8	7412	-242	32.0	2372	-184	5040	6.8	504	52.5	4127

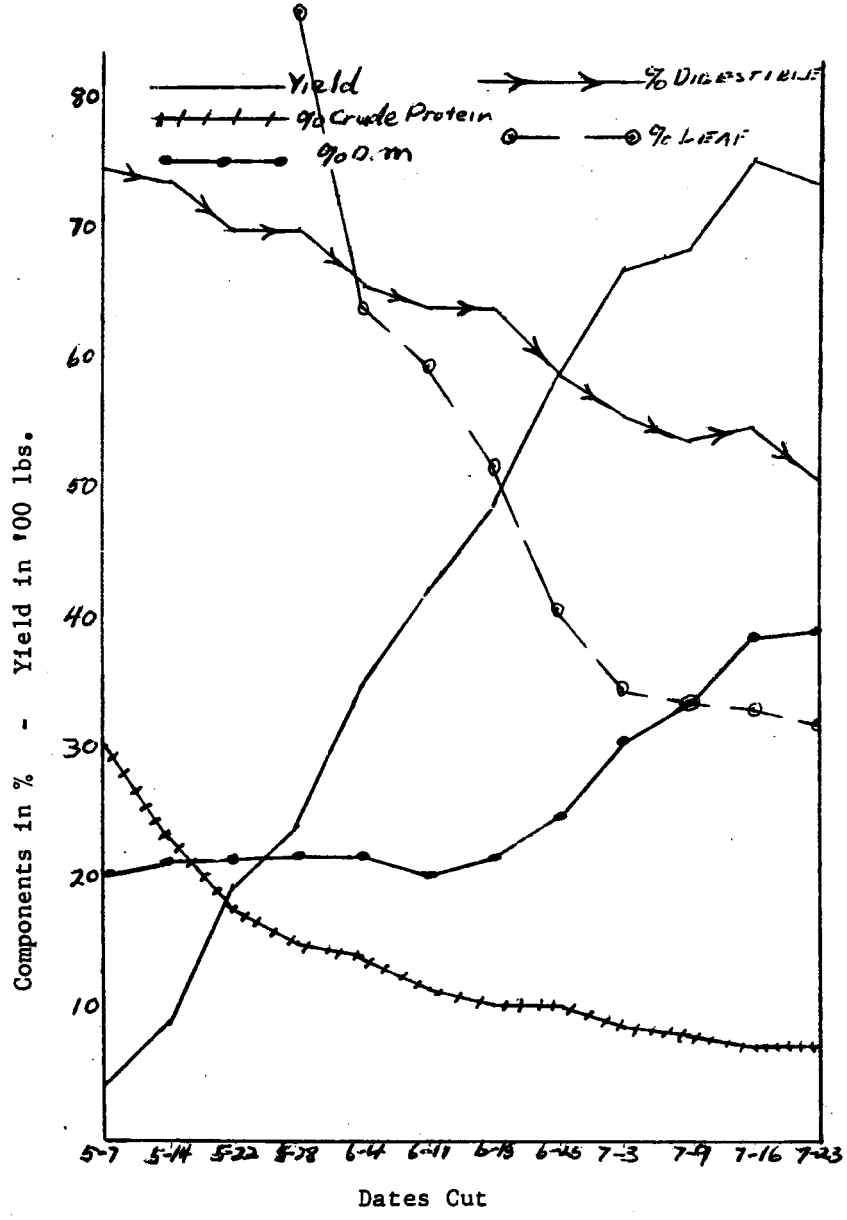
CLIMAX TIMOTHY - 1962





ESSEX TIMOTHY - 1962





TEST 157 - GROWTH CURVES - 1962

Aftermath Yields (Lbs./A)

No.	FIRST CUT Date	Yield	AFTERMATH HARVEST DATES 6-18	6-25	7-3	7-9	7-16	7-24	7-31	8-8	8-13	8-20	8-28	9-4	9-12	9-18	9-24	10-4	Afterm. Total	Total Yield
CLIMAX																				
1	5-7	599		5241										1383					6624	7223
2	5-14	1175		5123										1727					6850	8025
3	5-22	2385		2446														1447	3893	6278
4	5-28	2878			1831													1080	2911	5789
5	6-4	4283						1886										527	2413	6696
6	6-11	4820							1870									443	2313	7153
7	6-18	5589									2143								2143	7732
8	6-25	6631										2171							2171	8802
9	7-3	6890											1824						1824	8714
10	7-9	7579											2359						2359	9938
11	7-16	7440												2200					2200	9640
12	7-23	7752													2091				2091	9843
ESSEX																				
1	5-7	485		5023										788					5811	6296
2	5-14	808		5416										778					6194	7002
3	5=22	1929		2952														573	3525	5454
4	5-28	2455			2464													373	2837	5292
5	6-4	3523						1986										467	2453	5976
6	6-11	4291							1854									402	2256	6547
7	6-18	4813									1817								1817	6630
8	6-25	5941										1523							1523	7464
9	7-3	6734											1629						1629	8363
10	7-9	6803											1754						1754	8557
11	7-16	7654												1967					1967	9621
12	7-23	7412													1700				1700	9112

TEST 157 - HAY GROWTH CURVES - 1962

Heights and Stages - Timothy

Cut No.	Late	Yield	Ht	Stg	First Growth 5-14	5-22	5-28	6-4	6-11	6-18	6-25	Aftermaths 7-3	7-9	7-16	7-23	7-30	8-8	8-16	8-20	8-28	9-4	9-12	10-3	10-29
Climax																								
1	5-7	599	23	A	14 A	28 A	39 B	52 B	65 C	78 D	88 D	0	0	13 A	19 A	25 A	28 A	34 B	39 B	41 C	43 F			13 A
2	5-14	1175	28	A		25 A	35 B	48 B	66 C	76 D	88 D	0	7 A	14 A	23 A	28 A	36 A	41 C	46 D	50 D	53 F			12 A
3	5-22	2385	41	A			15 A	27 B	36 B	47 D	64 D	5 A	8 A	13 A	21 A	26 A	31 A	35 B	37 B	39 C	44 C		65 F	13 A
4	5-28	2878	53	B				6 A	20 A	31 A	46 B	53 C	9 A	13 A	19 A	23 A	27 A	31 B	32 B	35 C	37 C		46 D	12 A
5	6-4	4283	70	C					0	14 A	28 A	35 A	40 B	42 B	48 C	16 A	19 A	23 A	24 A	24 A	25 A		25 A	12 A
6	6-11	4820	78	C						0	15 A	26 A	29 A	32 A	37 B	39 B	18 A	23 A	24 A	26 A	26 A		26 A	12 A
7	6-18	5589	90	D							0	14 A	19 A	22 A	28 A	33 B	44 B	50 D	16 A	20 A	22 A			15 A
8	6-25	6631	102	E								0	11 A	18 A	26 A	36 A	46 B	50 B	56 B	17 A	21 A			17 A
9	7-3	6890	113	F									0	6 A	19 A	27 A	34 A	44 B	46 B	50 C	13 A			13 A
10	7-9	7579	113	F										12 A	19 A	29 A	39 A	47 B	52 C	56 D	14 A			15 A
11	7-16	7440	114	G											6 A	18 A	33 A	43 A	45 B	49 C	52 C			14 A
12	7-23	7752	115	G												14 A	25 A	39 A	40 A	46 B	48 B	50 C		15 A
Essex																								
1	5-7	485	22	A	12 A	24 A	32 B	42 B	57 C	68 C	78 D	0	0	10 A	18 A	20 A	25 A	28 B	30 A	30 B	35 C			12 A
2	5-14	808	24	A		23 A	30 B	39 B	58 B	71 C	82 D	0	0	10 A	19 A	22 A	27 A	30 B	32 B	33 C	35 C			13 A
3	5-22	1929	38	A			16 A	25 A	37 B	50 C	63 D	4 A	9 A	11 A	17 A	21 A	26 A	28 B	30 B	30 C	31 C		41 F	12 A
4	5-28	2455	45	B				15 A	26 B	38 B	53 C	61 D	5 A	10 A	13 A	20 A	22 A	25 A	25 A	24 B	27 B		30 B	12 A
5	6-4	3523	58	B					0	15 A	30 A	38 A	42 B	44 B	49 C	17 A	20 A	23 A	24 A	26 A	27 B		29 B	13 A
6	6-11	4291	68	B						0	15 A	27 A	31 A	33 A	38 B	37 B	18 A	22 A	23 A	23 A	23 A		23 A	13 A
7	6-18	4813	80	C							0	13 A	21 A	22 A	28 A	31 B	37 B	42 C	14 A	18 A	20 A			14 A
8	6-25	5941	87	D								0	0	14 A	21 A	27 A	37 B	42 B	43 B	16 A	19 A			15 A
9	7-3	6734	101	E									0	7 A	18 A	26 A	32 A	39 B	42 B	46 C	12 A			14 A
10	7-9	6803	99	F										0	11 A	24 A	34 A	40 A	42 B	47 C	13 A			14 A
11	7-16	7654	108	F											10 A	19 A	32 A	41 A	43 B	45 B	47 C			14 A
12	7-23	7412	107	G												11 A	24 A	34 A	37 A	39 B	40 B	42 C		14 A

Orchardgrass

1. Dry Matter Yield - The curves of the two varieties were very similar in shape. Frode grew faster and outyielded Ottawa throughout the season on any given date but both leveled off after the seed stage and ended at the same level. However, at similar stages of growth they had the same yield.

In 1961, the yield was very similar to 1962, Frode again being slightly higher on any date but similar at the same stage.

2. Height - The two variety height curves were very similar. Frode was taller on all dates but like yield, both varieties ended at the same height. They were the same height at the same stages of growth.

In 1961, the height curves were similar to those in 1962, Frode being taller, both ending the same and again being similar at the same stage of growth.

3. Percent Dry Matter - Varieties were similar in thevegetative stage. Once headed, Frode was higher and this difference gradually widened. There appears to be little similarity at the same stage of growth.

In 1961, again they were similar at the vegetative stage, gradually widened as in 1962, and were not similar at the same stages of growth.

4. Percent Crude Protein - The two varieties started at the same content but Frode was lower at all dates, similar at a given stage, until both were in flower, after which they were the same.

In 1961, the protein content was lower than in 1962, but the same general characteristics as above.

5. Percent Digestible Dry Matter - The curves on digestibility were very similar with the two varieties. Ottawa was 2-3% higher throughout than Frode but very similar at the same stage of growth.

In 1961, the curve shapes of the two varieties was very similar. Ottawa was again higher throughout but the two were similar at the same stage of development.

6. Leaf - In percentage and yield of leaf, Frode was lower at all dates and stages of growth than Ottawa. The Frode leaf yield leveled off, the Ottawa continued to increase with succeeding cuts.

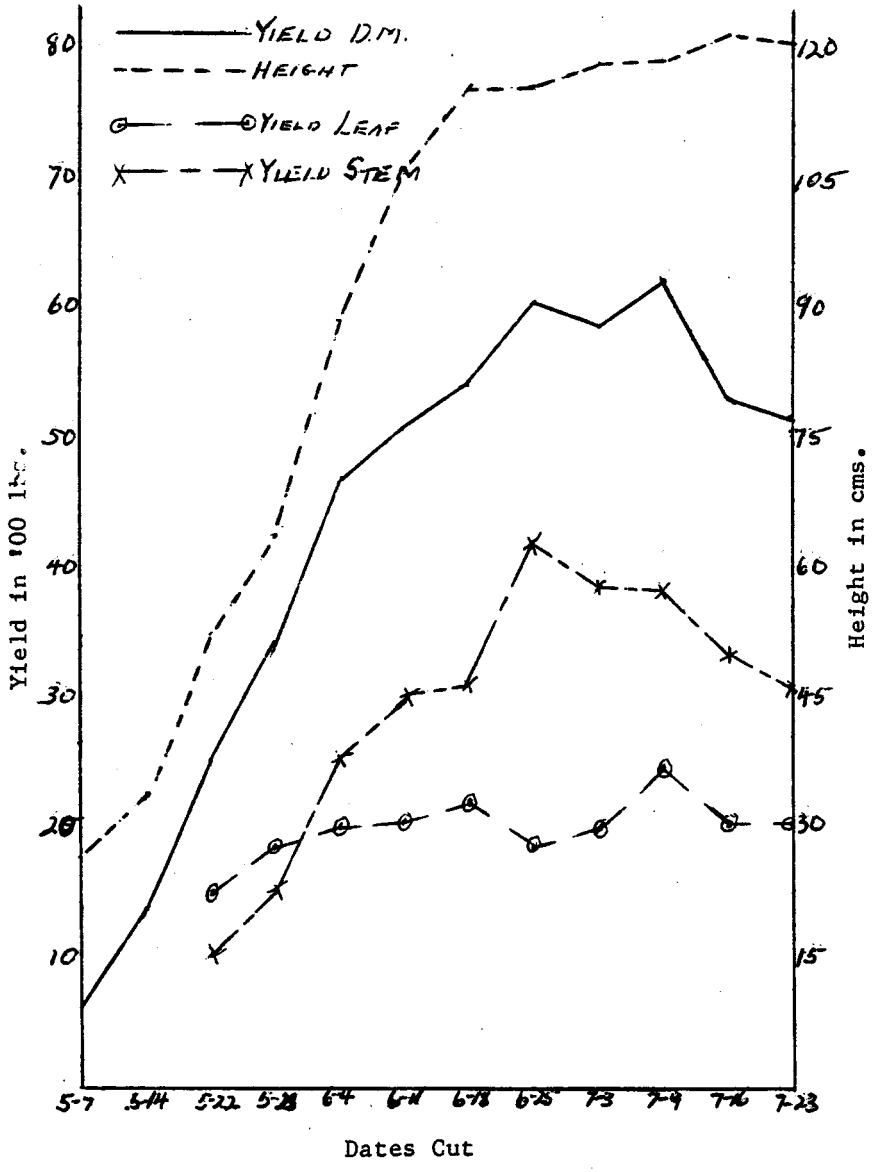
In 1961, the percentage and yield of leaves was very similar on any one date, Yield increases were largely due to an increase in stem weight.

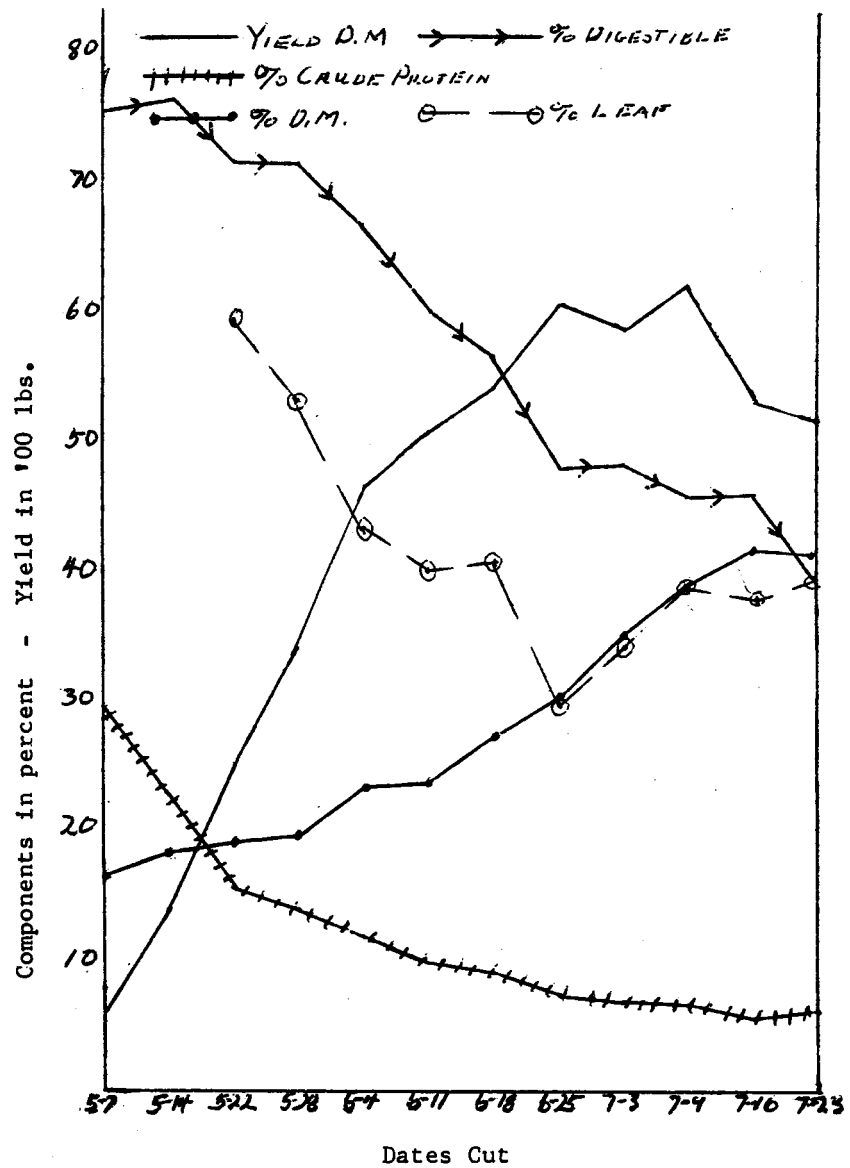
TEST 157 - HAY GROWTH CURVES - 1962

First Crop Data (Yield lbs./acre)

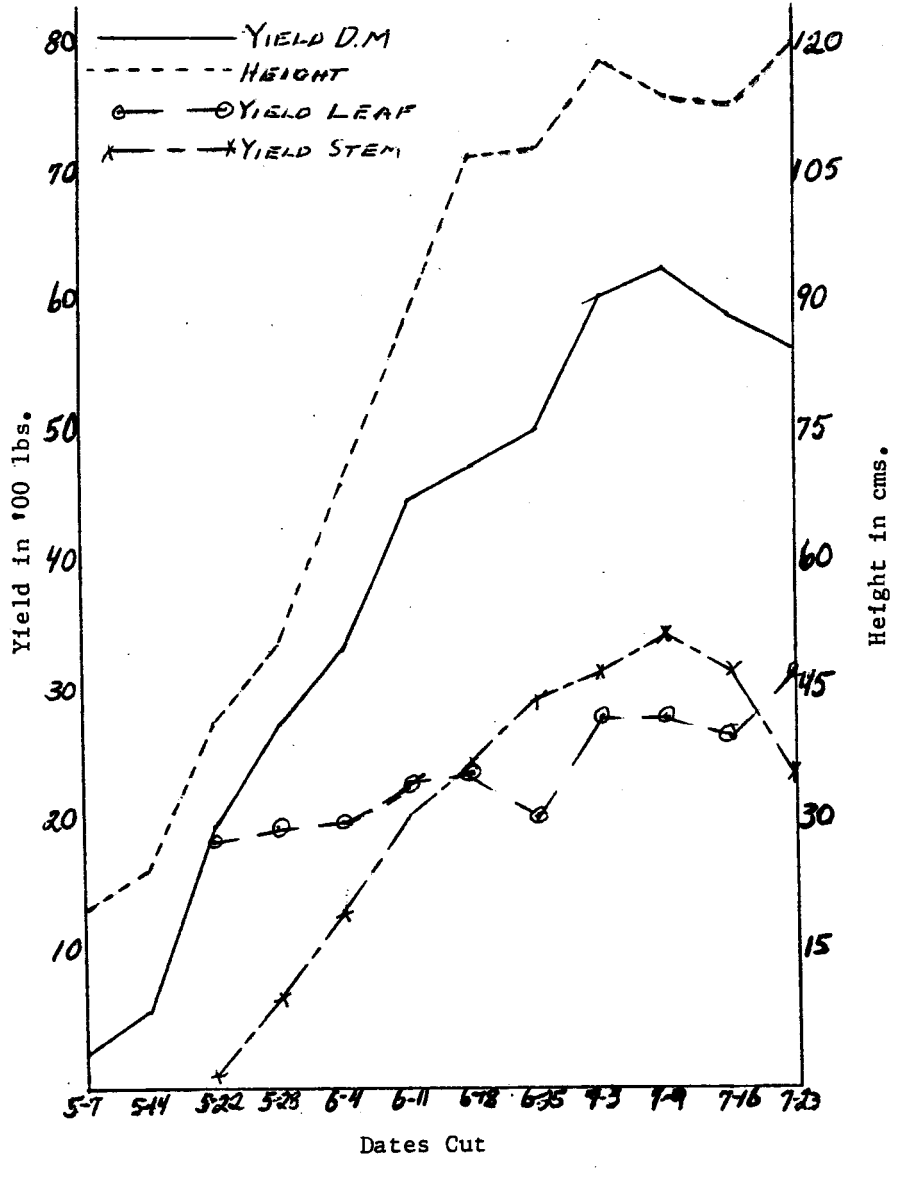
Cut No.	Date Cut	Stage Cut	Height cms.	% D.M.	Yield D.M.	Weekly Increase D.M.	% Leaf	Yield Leaf	Weekly Increase Leaf	Yield Stem	% Crude Protein	Yield Crude Protein	% Digestible Dry Matter	Yield Digestible Dry Matter
FRODE														
1	5-7	Veg.	27	16.2	675	----	----	----	----	----	29.5	200	76.2	556
2	5-14	Veg.	34	17.7	1341	666	----	----	----	----	22.9	310	77.6	1161
3	5-22	Boot	52	18.1	2561	1220	59.6	1526	----	1035	16.9	462	72.2	1914
4	5-28	Head	64	19.5	3429	868	53.4	1831	305	1598	13.9	480	72.1	2567
5	6-4	Head	89	23.2	4616	1187	43.7	2017	186	2599	11.9	547	67.6	3022
6	6-11	Flower	107	23.3	5134	518	40.4	2074	57	3060	10.0	556	60.5	3208
7	6-18	Flower	116	27.8	5444	310	41.8	2276	202	3168	9.0	488	57.4	3079
8	6-25	Seed	116	30.8	6093	649	30.4	1852	-424	4241	7.7	472	48.4	2942
9	7-3	Seed	118	35.8	5891	-202	34.7	2044	192	3847	7.5	438	48.9	2857
10	7-9	Seed	119	38.8	6295	404	39.4	2480	436	3815	7.3	462	46.5	3048
11	7-16	Seed	122	41.8	5385	-910	38.2	2057	-423	3328	6.6	356	46.4	2526
12	7-23	Seed	121	41.7	5191	-194	39.7	2062	5	3129	6.1	317	39.0	2155
OTTAWA 100														
1	5-7	Veg.	21	18.0	384	----	----	----	----	----	32.2	124	76.5	256
2	5-14	Veg.	25	17.5	654	270	----	----	----	----	27.6	183	77.7	619
3	5-22	Joint	42	18.6	2042	1388	93.7	1913	----	129	21.3	438	73.6	1541
4	5-28	Boot	53	19.1	2809	767	73.2	2056	143	753	17.4	491	74.9	2142
5	6-4	Head	70	21.7	3473	664	60.2	2091	35	1382	14.0	487	72.2	2508
6	6-11	Head	89	21.2	4535	1062	51.6	2340	249	2195	12.6	513	65.3	3033
7	6-18	Flower	108	24.2	4872	337	50.0	2436	96	2436	11.0	540	62.4	2906
8	6-25	Flower	109	27.1	5137	265	41.6	2137	299	3000	9.5	489	54.8	2999
9	7-3	Seed	119	33.0	6100	963	46.3	2824	687	3276	8.5	515	49.7	2974
10	7-9	Seed	115	34.3	6361	261	44.5	2831	7	3530	7.8	499	49.1	3139
11	7-16	Seed	114	36.7	5949	-412	46.1	2742	- 89	3207	7.0	416	50.0	2816
12	7-23	Seed	121	33.7	5661	-288	56.8	3215	473	2446	6.9	394	47.5	2689

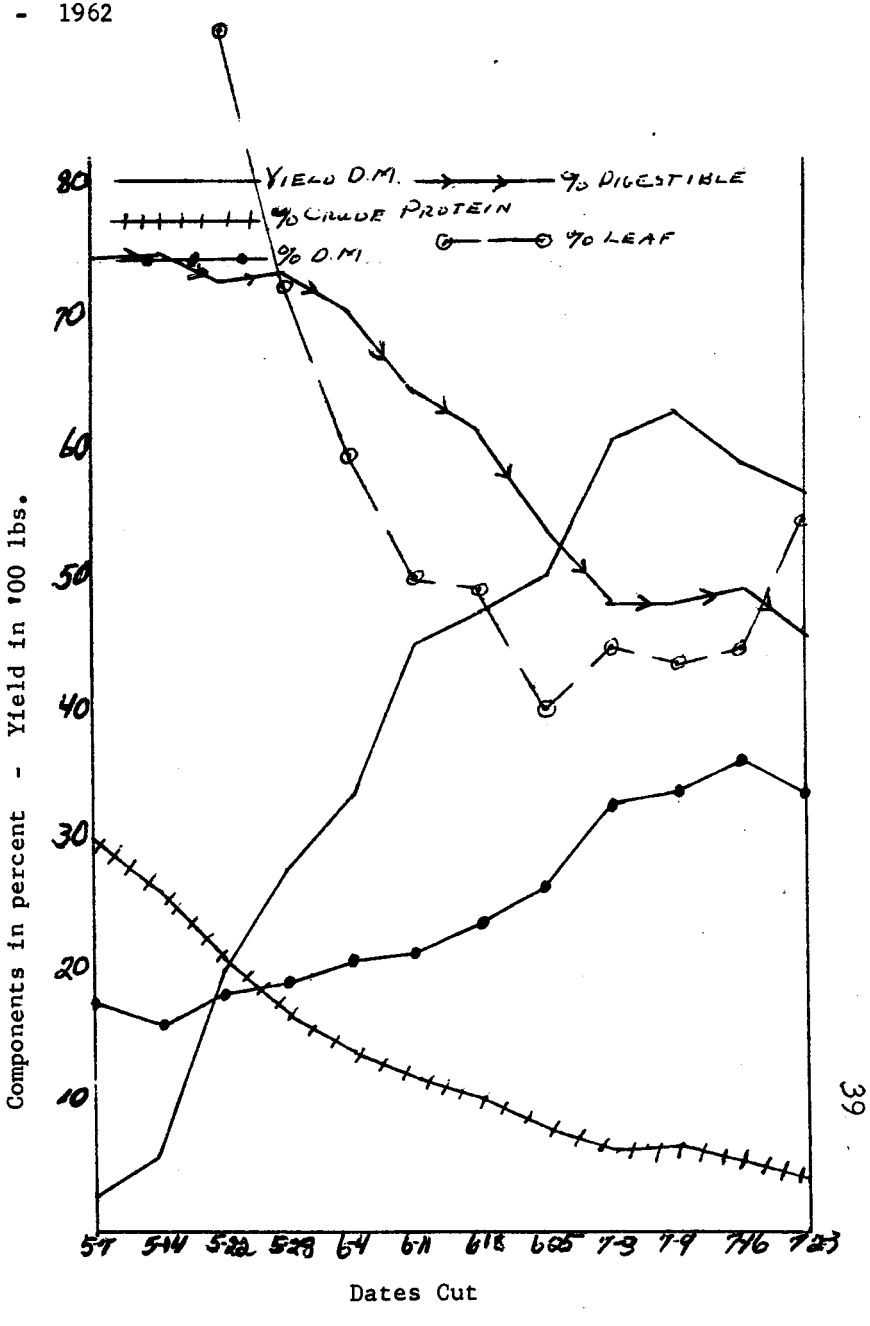
FRODE ORCHARD - 1962





OTTAWA 100 ORCHARD - 1962





TEST 157 - GROWTH CURVES - 1962

Aftermath Yields (Lbs./A)

FIRST CUT			AFTERMATH HARVEST DATES															Afterm	Total
No.	Date	Yield	6-18	6-25	7-3	7-9	7-16	7-24	7-31	8-8	8-13	8-20	8-28	9-4	9-12	9-18	9-24	10-4	Total	Yield
FRODE																				
1	5-7	675	3418							1151									4569	5244
2	5-14	1341	3427							1023									4450	5791
3	5-22	2561		2352												1301			3653	6214
4	5-28	3429			2091											1227			3318	6747
5	6-4	4616			1541											1262			2803	7419
6	6-11	5134					1530									1100			2630	7764
7	6-18	5444							1759									807	2566	8010
8	6-25	6093										2016						311	2327	8420
9	7-3	5891										1501						296	1797	7688
10	7-9	6295										1998						402	2400	8695
11	7-16	5385											1996					238	2234	7619
12	7-23	5191											1793					234	2027	7218
OTTAWA 100																				
1	5-7	384	4177							926									5103	5487
2	5-14	654	3586							832									4418	5072
3	5-22	2042		2479												1215			3694	5736
4	5-28	2809			2151											1051			3202	6011
5	6-4	3473			1388											845			2233	5706
6	6-11	4535					1744									921			2665	7200
7	6-18	4872							1518									592	2110	6982
8	6-25	5137										1888						214	2102	7239
9	7-3	6100										1608						254	1862	7962
10	7-9	6361										1965						304	2269	8630
11	7-16	5949											2130					236	2366	8315
12	7-23	5661											1859					222	2081	7742

TEST 157 - HAY GROWTH CURVES - 1962

Heights and Stages - Orchard Grass

Cut	First Growth				Aftermaths																		
No.	Date	Yield	Ht	Stg	5-14	5-22	5-28	6-4	6-11	6-18	6-25	7-3	7-9	7-16	7-23	7-30	8-8	8-16	8-20	8-28	9-4	10-3	10-29
Frode																							
1	5-7	675	27	A	13 A	31 A	42 C	63 D	86 F	98 F	22 A	31 A	36 A	38 A	40 A	39 A	42 A	21 A	24 A	28 A	31 A	-	24 A
2	5-14	1341	34	A		28 A	38 C	61 D	82 E	94 F	22 A	32 A	34 A	37 A	38 A	35 A	40 A	20 A	24 A	26 A	29 A		20 A
3	5-22	2561	52	C			16 A	30 A	39 A	56 A	79 F	19 A	26 A	32 A	36 A	36 A	40 A	41 A	42 A	43 A	44 A		14 A
4	5-28	3429	64	D				19 A	30 A	44 A	60 A	65 A	12 A	24 A	31 A	34 A	36 A	41 A	42 A	42 A	42 A		14 A
5	6-4	4616	89	E					20 A	34 A	45 A	55 A	15 A	26 A	35 A	35 A	38 A	41 A	43 A	43 A	44 A		15 A
6	6-11	5134	107	F						21 A	35 A	42 A	48 A	52 A	20 A	30 A	37 A	38 A	39 A	39 A	38 A		13 A
7	6-18	5444	116	F							23 A	31 A	39 A	42 A	48 A	51 A	23 A	35 A	36 A	39 A	40 A	40 A	13 A
8	6-25	6093	116	G								16 A	23 A	27 A	34 A	44 A	54 A	59 A	60 A	21 A	27 A	27 A	14 A
9	7-3	5891	118	G									11 A	22 A	30 A	38 A	46 A	51 A	53 A	13 A	24 A	25 A	13 A
10	7-9	6295	119	G										18 A	30 A	36 A	51 A	60 A	61 A	21 A	26 A	26 A	15 A
11	7-16	5385	122	G											22 A	32 A	43 A	51 A	53 A	61 A	15 A	23 A	14 A
12	7-23	5191	121	G												24 A	39 A	47 A	49 A	58 A	17 A	24 A	13 A
Ottawa 100																							
1	5-7	384	21	A	15 A	32 A	42 A	55 D	77 E	97 F	21 A	31 A	35 A	35 A	37 A	32 A	35 A	19 A	22 A	23 A	24 A		18 A
2	5-14	654	25	A		24 A	35 A	44 D	70 E	92 F	21 A	30 A	33 A	34 A	34 A	31 A	32 A	19 A	22 A	24 A	24 A		16 A
3	5-22	2042	42	B			17 A	29 A	38 A	54 D	69 F	19 A	27 A	31 A	33 A	34 A	39 A	41 A	42 A	43 A	44 A		14 A
4	5-28	2809	53	C				20 A	31 A	40 A	55 A	64 A	13 A	23 A	31 A	33 A	37 A	38 A	39 A	40 A	41 A		13 A
5	6-4	3473	70	D					21 A	33 A	43 A	54 A	15 A	25 A	32 A	32 A	35 A	35 A	35 A	36 A	36 A		17 A
6	6-11	4535	89	E						21 A	34 A	41 A	46 A	50 A	21 A	29 A	34 A	35 A	36 A	36 A	36 A		13 A
7	6-18	4872	108	F							21 A	29 A	34 A	38 A	42 A	45 A	22 A	30 A	32 A	33 A	33 A	33 A	13 A
8	6-25	5137	109	F								16 A	22 A	27 A	33 A	38 A	48 A	51 A	53 A	17 A	24 A	24 A	12 A
9	7-3	6100	119	G									8 A	20 A	28 A	37 A	42 A	47 A	49 A	17 A	23 A	23 A	12 A
10	7-9	6361	115	G										18 A	28 A	35 A	44 A	52 A	54 A	17 A	23 A	23 A	13 A
11	7-16	5949	114	G											20 A	30 A	42 A	48 A	52 A	59 A	15 A	22 A	13 A
12	7-23	5661	121	G												25 A	35 A	41 A	47 A	52 A	16 A	23 A	14 A

Bromegrass

1. Dry Matter Yield - The two varieties have similar yield curves but the Canada brome did vary some. Saratoga yielded more throughout the season and was higher at the last harvest. This was unlike the other grass species which were similar in final yield. Both curves started to flatten on the same date, June 4, but not at the same stage of growth.

In 1961, the curves of the two varieties were identical in shape but Saratoga again was slightly higher in yield. Unlike 1962, the two varieties gave similar yields at the same stage of growth.

2. Height - Saratoga was about 10 cms. taller than Canada brome until heading, after which it was 20 cms. taller, with little agreement at similar stages.

In 1961, the height curves were similar in shape, Saratoga was again taller and this difference also was greater during the later cuts.

3. Percent Dry Matter - Both varieties were similar until the boot stage of development after which Saratoga was 2-4% higher in dry matter; however, they were similar at the last cut.

In 1961, the same trends occurred as in 1962.

4. Percent Crude Protein - In general, Saratoga was lower than Canada brome in protein throughout the season, coming together only at the flowering stage.

In 1961, the two varieties performed as in 1962.

5. Percent Digestible Dry Matter - In 1962 the two varieties in general were similar with some overlapping from week to week. Saratoga started out higher but after heading both were similar on a given date and stage.

In 1961, the varieties performed very similar as in 1962.

In both years bromegrass was higher in digestibility than the other species tested.

6. Leaf - Saratoga was higher in percent leaf at most dates of cut and at most stages. This variety was considerably higher in weight of leaves from the heading stage.

In 1961, there was a general similarity in the percent and yield of leaf at the same dates and stages.

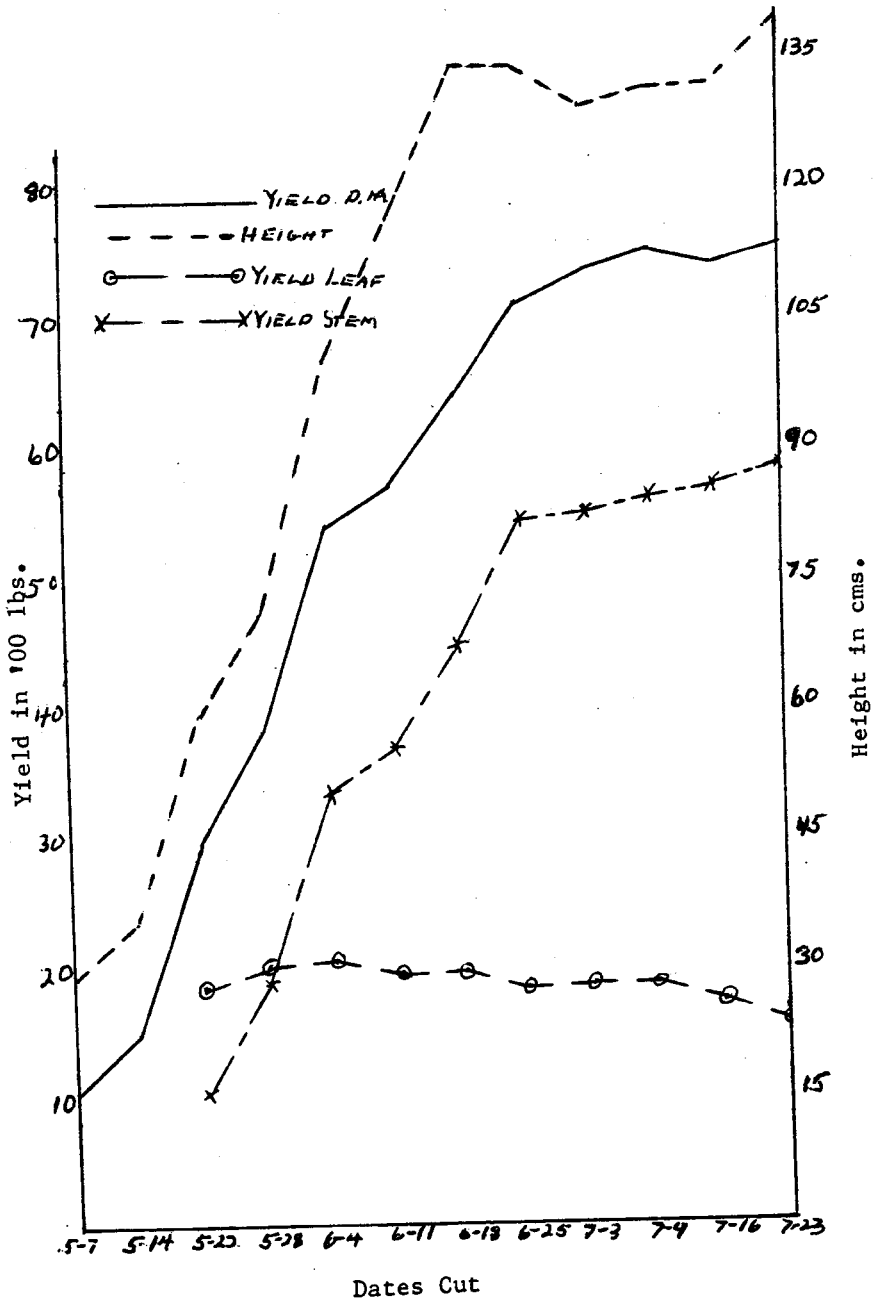
In both years, the percentage and yield of leaf was lower with bromegrass than with the other grass species.

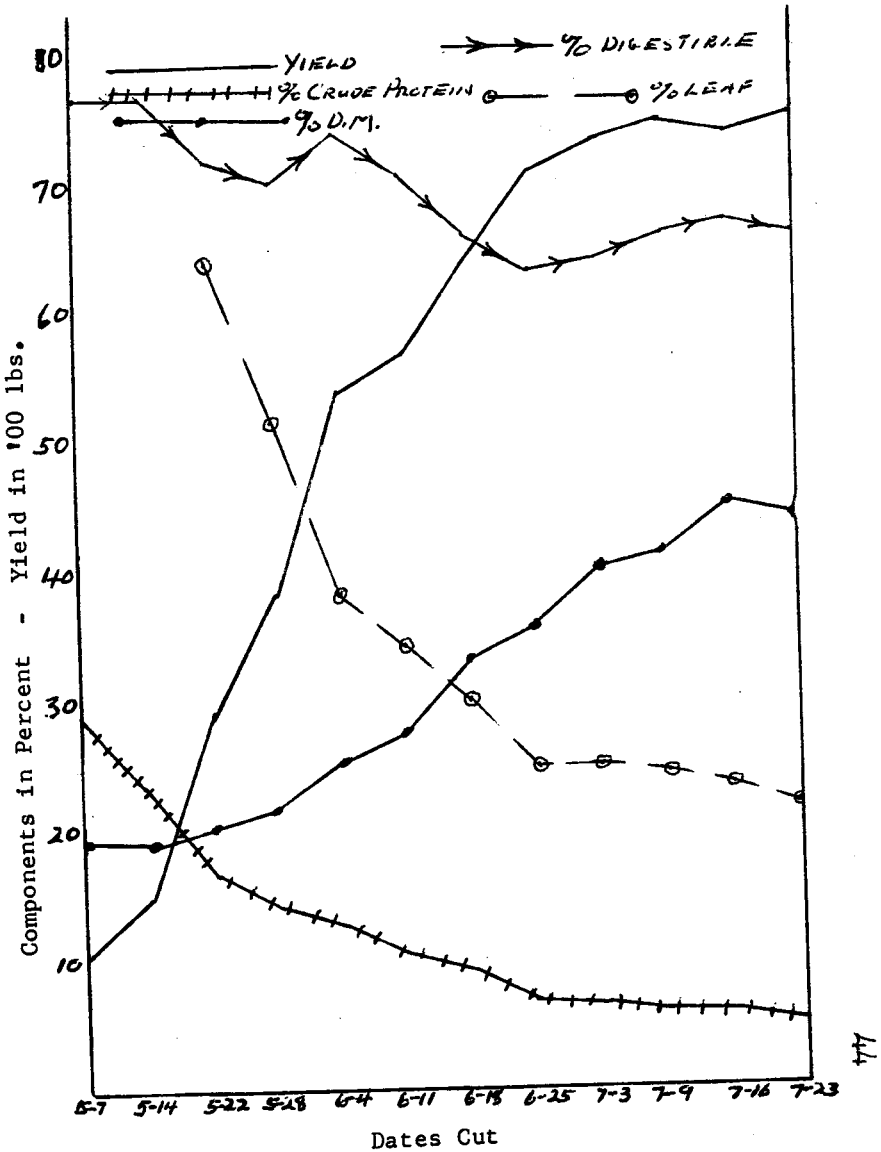
TEST 157 - HAY GROWTH CURVES - 1962

First Crop Data (Yield lbs./acre)

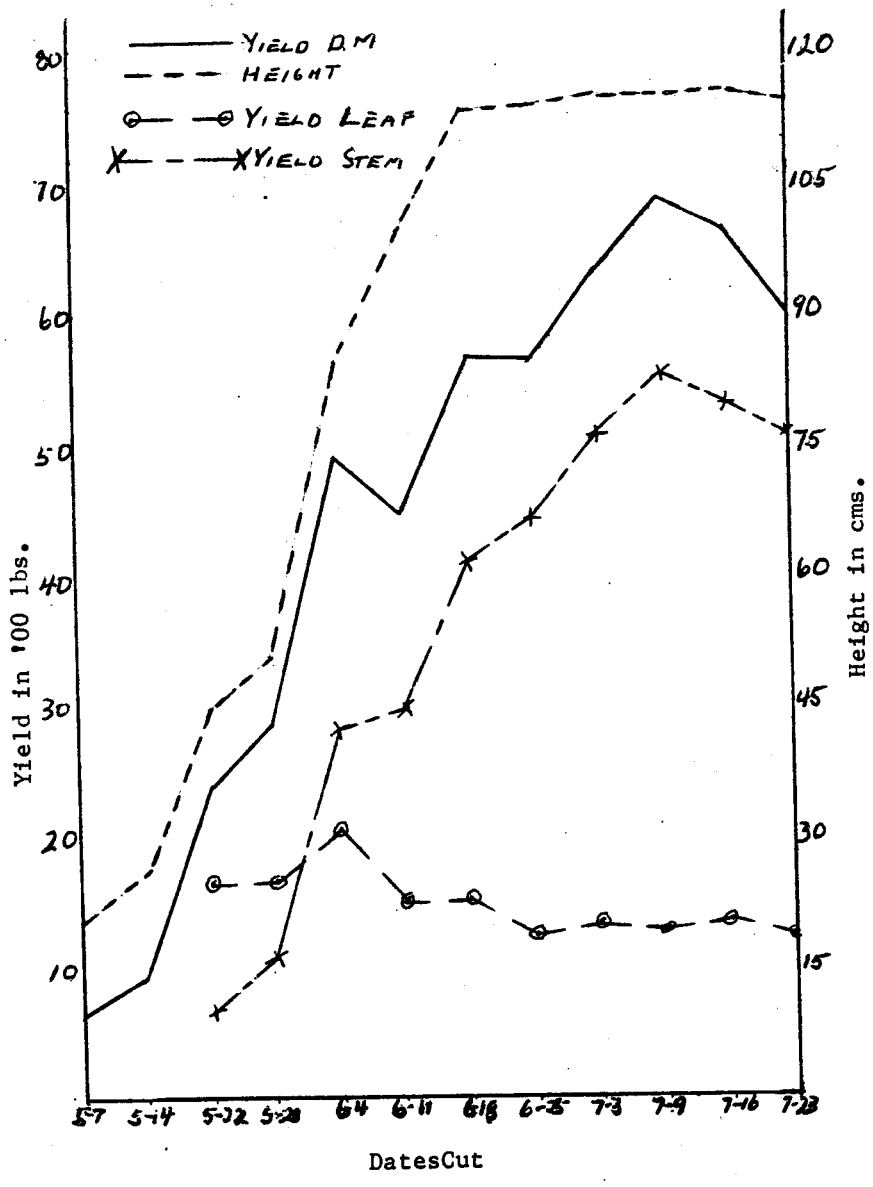
Cut No.	Date Cut	Stage Cut	Height cms.	% D.M.	Yield D.M.	Weekly Increase D.M.	% Leaf	Yield Leaf	Weekly Increase Leaf	Yield Stem	% Crude Protein	Yield Crude Protein	% Digestible Dry Matter	Yield Digestible Dry Matter
SARATOGA														
1	5-7	Veg.	29	19.6	1081	----	----	----	----	----	29.1	314	77.3	817
2	5-14	Veg.	35	19.0	1523	442	----	----	----	----	23.3	354	77.7	1230
3	5-22	Boot	59	20.1	2957	1434	64.0	1892	----	1065	17.9	530	72.9	2276
4	5-28	Boot	71	22.3	3872	915	52.3	2025	133	1847	14.4	559	70.8	2689
5	6-4	Head	100	25.8	5433	1561	38.1	2070	45	3363	12.5	682	74.2	3808
6	6-11	Head	117	28.2	5661	228	34.4	1947	-123	3714	10.6	601	71.5	3985
7	6-18	Head	134	33.0	6404	743	30.3	1940	- 7	4464	9.6	618	66.2	4161
8	6-25	Flower	134	36.7	7266	862	25.0	1817	-123	5449	7.9	575	63.6	4656
9	7-3	Seed	129	40.6	7330	64	25.2	1847	30	5483	7.8	531	64.6	4354
10	7-9	Seed	132	41.8	7525	195	24.6	1851	4	5674	6.4	484	66.7	4782
11	7-16	Seed	133	45.1	7456	- 69	23.5	1752	- 99	5704	6.0	447	67.7	4845
12	7-23	Seed	139	44.9	7563	107	22.7	1717	- 35	5846	5.6	426	66.5	5374
CANADA BROME														
1	5-7	Veg.	22	20.4	650	----	----	----	----	----	31.1	202	70.9	516
2	5-14	Veg.	26	20.9	911	261	----	----	----	----	26.0	241	72.0	785
3	5-22	Joint	45	20.2	2437	1526	71.1	1733	----	704	21.4	543	68.6	1615
4	5-28	Boot	53	21.7	2894	457	60.7	1757	24	1137	17.7	511	75.1	2181
5	6-4	Head	85	22.9	4997	2103	42.8	2139	382	2858	14.7	733	72.8	3478
6	6-11	Head	100	23.8	4568	-429	34.2	1562	-577	3006	12.2	556	71.2	3117
7	6-18	Head	114	28.9	5779	1211	27.4	1583	21	4196	11.1	644	65.3	3771
8	6-25	Flower	114	33.4	5776	- 3	22.2	1282	301	4494	8.9	513	65.2	3728
9	7-3	Flower	117	36.8	6471	695	20.9	1352	70	5119	7.5	508	65.5	4311
10	7-9	Seed	116	37.9	6974	503	18.6	1297	- 55	5677	7.6	529	64.3	4515
11	7-16	Seed	117	42.3	6699	275	19.6	1313	16	5386	7.0	463	66.2	4419
12	7-23	Seed	115	43.9	6348	351	19.6	1244	- 69	5104	6.5	415	66.8	4206

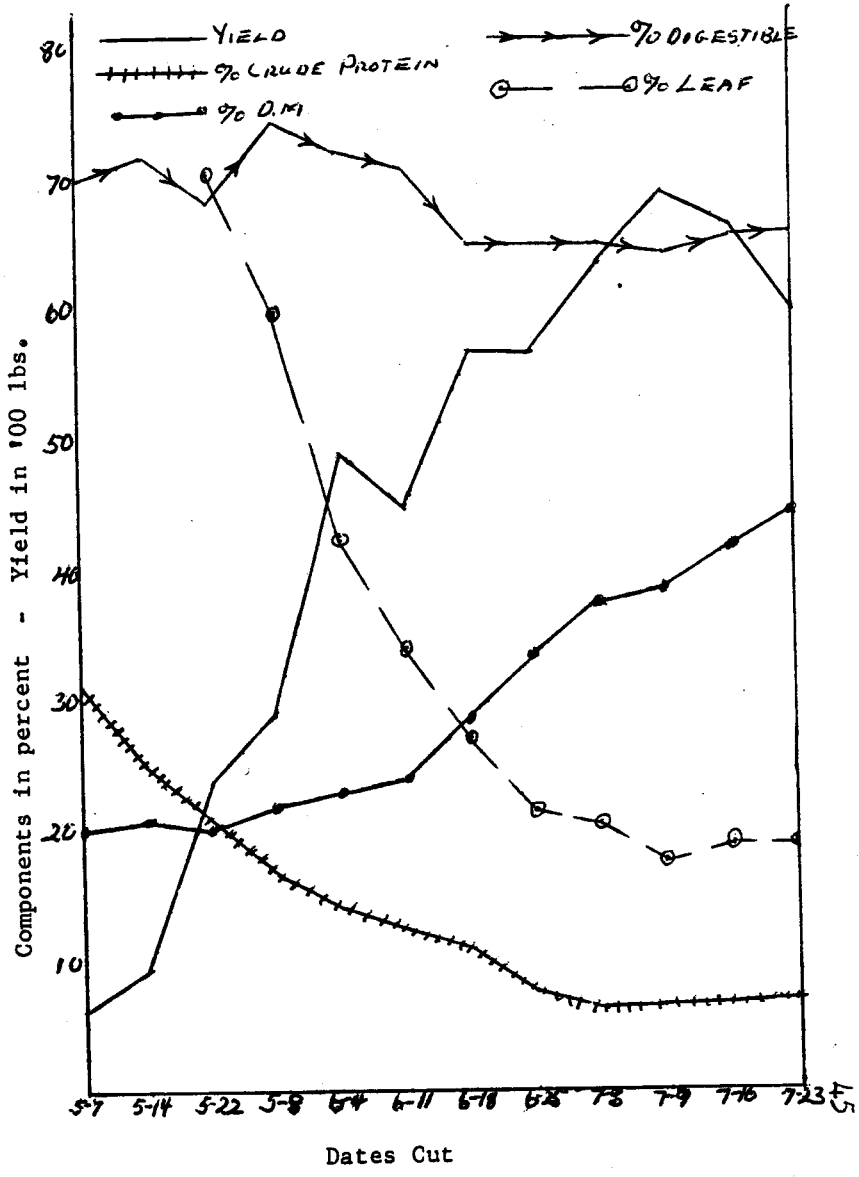
SARATOGA BROME - 1962





CANADA BROME - 1962





TEST 157 - GROWTH CURVES - 1962

Aftermath Yields (Lbs./A)

FIRST CUT			AFTERMATH HARVEST DATES															Aftm.	Tot.
No.	Date	Yield	6-18	6-25	7-3	7-9	7-16	7-24	7-31	8-8	8-13	8-20	8-28	9-4	9-12	9-18	9-24	10-4	Total	Yield
SARATOGA																				
1	5-7	1081	4228														1618		5846	6927
2	5-14	1523	2773														1244		4017	5540
3	5-22	2957			2225												988		3213	6170
4	5-28	3872				2374											907		3281	7153
5	6-4	5433				1742											834		2576	8009
6	6-11	5661							2202										2202	7863
7	6-18	6404									2013								2013	8417
8	6-25	7266											2421						2421	9687
9	7-3	7330											2100						2100	9430
10	7-9	7525											2209						2209	9734
11	7-16	7456													2006				2006	9462
12	7-23	7563													1610				1610	9173
CANADA BROME																				
1	5-7	650	4274														697		4971	5621
2	5-14	911	3845														988		4833	5744
3	5-22	2437			2278												223		2501	4938
4	5-28	2894				2273											277		2550	5444
5	6-4	4997				1619											490		2109	7106
6	6-11	4568							1986										1986	6554
7	6-18	5779									2132								2132	7911
8	6-25	5776											1496						1496	7272
9	7-3	6471											1182						1182	7653
10	7-9	6974											1698						1698	8672
11	7-16	6699													1313				1313	8012
12	7-23	6348													963				963	7311

TEST 157 - HAY GROWTH CURVES - 1962

Heights and Stages - Bromegrass

Cut No.	First Growth Late	Yield	Hgt	Stg	Aftermaths 5-14	5-22	5-28	6-4	6-11	6-18	6-25	7-3	7-9	7-16	7-23	7-30	8-8	8-16	8-20	8-28	9-4	9-12	9-24	10-29
Saratoga																								
1	5-7	1081	29	A	14 A	33 B	45 C	69 D	101 E	114 E	0	20 A	26 A	32 A	34 B	34 B	39 B	41 B	42 B	42 B	42 B		43 B	13 A
2	5-14	1523	35	A		26 B	35 C	53 D	85 E	97 E	3 A	24 A	30 A	31 B	35 B	37 B	38 B	38 B	38 B	38 B	39 B		39 B	10 A
3	5-22	2957	59	C			0	8 A	23 A	37 A	57 B	69 B	0	11 A	21 A	26 A	29 B	31 B	31 B	33 B	34 B		34 B	11 A
4	5-28	3872	71	C				0	13 A	29 A	46 B	56 B	61 B	0	18 A	23 A	28 A	31 B	32 B	32 B	33 B		33 B	12 A
5	6-4	5433	100	E					0	19 A	34 A	45 B	50 B	11 A	21 A	23 A	27 A	30 B	30 B	30 B	31 B		31 B	12 A
6	6-11	5661	117	E						0	22 A	34 A	40 A	44 B	48 B	49 B	11 A	21 A	22 A	23 A	24 A			23 A
7	6-18	6404	134	E							0	20 A	27 A	30 A	35 B	40 B	46 B	50 B	13 A	16 A	19 A			19 A
8	6-25	7266	134	F								0	13 A	21 A	30 A	41 B	51 B	54 B	54 B	59 C	10 A			17 A
9	7-3	7330	129	G									0	11 A	25 A	33 A	46 B	52 B	54 B	56 D	10 A			16 A
10	7-9	7525	132	G										6 A	23 A	31 A	45 B	50 B	52 B	58 D	12 A			16 A
11	7-16	7456	133	G											8 A	20 A	31 A	45 B	47 B	51 B	52 B	54 D		14 A
12	7-23	7563	139	G												14 A	28 A	37 A	40 B	43 B	45 B	46 D		13 A
Canada Brome																								
1	5-7	650	22	A	13 A	28 B	36 C	59 D	88 E	100 E	0	18 A	22 A	24 A	26 B	29 B	32 B	33 B	33 B	34 B	34 B		34 B	11 A
2	5-14	911	26	A		24 B	32 C	52 D	82 E	99 E	0	19 A	25 A	28 A	31 B	32 B	34 B	35 B	35 B	35 B	37 C		37 C	11 A
3	5-22	2437	45	B			0	15 A	25 A	43 A	60 B	68 B	0	12 A	21 A	24 A	24 A	27 B	27 B	27 B	27 B		27 B	13 A
4	5-28	2894	53	C				0	14 A	28 A	44 B	53 B	58 B	0	18 A	21 A	23 A	27 A	27 A	27 A	28 B		28 B	12 A
5	6-4	4997	85	D					0	18 A	33 A	43 B	49 B	10 A	20 A	22 A	26 A	29 A	29 B	30 B	30 B		30 B	12 A
6	6-11	4568	100	E						0	20 A	32 A	39 A	45 B	48 B	48 B	13 A	18 A	20 A	21 A	21 A			16 A
77	6-18	5779	114	E							3 A	23 A	31 A	36 B	41 B	44 B	48 B	51 B	14 A	16 A	18 A			15 A
8	6-25	5776	114	F								0	12 A	21 A	29 A	34 A	39 B	43 B	44 B	47 D	13 A			13 A
9	7-3	6471	117	F									0	13 A	23 A	28 A	33 A	37 B	40 B	42 D	13 A			13 A
10	7-9	6974	116	G										10 A	25 A	30 A	39 B	45 B	47 B	50 D	14 A			13 A
11	7-16	6699	117	G											12 A	20 A	29 A	36 B	39 B	40 B	41 B	43 D		13 A
12	7-23	6348	115	G												14 A	23 A	31 A	33 B	34 B	35 B	36 B		13 A

HAY GROWTH CURVES - 1961, 1962

Per Cent Digestible Dry Matter

First Growth		Alfalfa		Timothy		Orchard		Brome	
Cut No.	Date	Vernal	DuPuits	Climax	Essex	Frode	Ott.100	Saratoga	Canada
1961 - TEST 151									
1	5-8	48.8	54.3	50.7	46.9	46.6	37.1	61.2	60.1
2	5-15	69.9	71.5	66.5	67.5	63.7	60.0	74.9	75.6
3	5-23	79.1	75.1	73.4	68.6	69.8	68.6	78.4	74.0
4	5-29	78.3	74.4	74.3	71.8	67.6	71.5	79.7	73.2
5	6-5	75.9	71.2	67.6	66.6	63.8	64.6	69.6	72.5
6	6-12	69.6	69.5	64.6	64.0	55.4	64.5	65.5	69.5
7	6-19	68.6	66.4	62.8	62.4	55.4	60.5	63.5	63.9
8	6-26	63.5	63.4	----	60.9	53.1	59.2	60.1	63.7
9	7-3	63.3	----	54.4	54.4	45.7	53.3	60.9	60.2
10	7-10	65.1	63.9	51.7	54.1	54.5	55.5	60.9	60.3
11	7-17	57.5	58.3	49.0	52.4	48.9	48.1	58.9	57.2
12	7-24	57.5	54.5	44.9	46.2	45.1	43.8	58.2	57.7
1962 - TEST 157									
1	5-7	74.8	74.3	71.9	74.3	76.2	76.5	77.3	70.9
2	5-14	75.3	80.2	70.4	73.6	77.6	77.7	77.7	72.0
3	5-22	75.0	73.9	67.0	70.3	72.2	73.6	72.9	68.6
4	5-28	76.4	73.0	65.6	70.9	72.1	74.9	70.8	75.1
5	6-4	71.2	69.7	66.7	66.2	67.6	72.2	74.2	72.8
6	6-11	65.8	65.2	61.8	64.4	60.5	65.3	71.5	71.2
7	6-18	63.2	63.6	58.1	64.5	57.4	62.4	66.2	65.3
8	6-25	6.20	60.0	52.5	58.4	48.4	54.8	63.6	65.2
9	7-3	57.8	60.5	50.0	56.1	48.9	49.7	64.6	65.5
10	7-9	60.6	60.0	48.3	54.0	46.5	49.1	66.7	64.3
11	7-16	59.9	59.3	49.5	55.3	46.4	50.0	67.7	66.2
12	7-23	57.4	55.6	47.6	52.5	39.0	47.5	66.5	66.8

TEST 157 - HAY GROWTH CURVES - 1962

Per Cent Crude Protein

First Growth		Alfalfa		Timothy		Orchard		Brome	
Cut No.	Date	Vernal	DuPuits	Climax	Essex	Frode	Ott.100	Saratoga	Canada
1	5-7	32.3	34.1	28.7	30.7	29.5	32.2	29.1	31.1
2	5-14	29.9	31.5	23.2	23.9	22.9	27.6	23.3	26.0
3	5-22	23.9	24.2	17.9	18.7	16.9	21.3	17.9	21.4
4	5-28	22.9	21.8	15.9	15.6	13.9	17.4	14.4	17.7
5	6-4	21.8	20.0	13.4	14.6	11.9	14.0	12.5	14.7
6	6-11	20.3	18.5	11.4	12.9	10.0	12.6	10.6	12.2
7	6-18	19.2	17.4	10.2	10.8	9.0	11.0	9.6	11.1
8	6-25	18.2	17.4	9.3	10.1	7.7	9.5	7.9	8.9
9	7-3	16.3	17.0	7.8	8.5	7.5	8.5	7.8	7.5
10	7-9	16.8	15.8	7.0	7.7	7.3	7.8	6.4	7.6
11	7-16	14.8	14.1	6.5	6.7	6.6	7.0	6.0	7.0
12	7-23	14.4	13.9	6.7	6.8	6.1	6.9	5.6	6.5

SEEDED: MAY 17, 1961 MIXTURE DIVERSITY TRIAL - 1961 (TEST 310) LOCATION: E-18

Early Cut - June 1, 1962

Association	Lbs. D.M./Acre, Alfalfa + Grass				% Alfalfa			% Grass		
	June 1	July 5	Aug 22	Total	June 1	July 5	Aug 22	June 1	July 5	Aug. 22
DuPuits + Lincoln	4236	2230	2631	9097	88.8	98.3	98.4	11.2	1.7	1.6
+ Climax	4162	2248	2803	9213	96.3	99.6	98.0	3.7	.4	2.0
+ Frode	4092	2814	2814	9197	82.4	91.1	86.3	17.6	8.9	13.7
Mean	4163	2749	2749	9168	89.2	96.3	94.2	10.8	3.7	5.8
Vernal + Lincoln	4413	1790	2280	8483	71.9	90.1	88.2	28.2	9.9	11.8
+ Climax	4000	1813	2423	8236	85.3	98.9	98.6	14.7	1.1	1.4
+ Frode	3804	1755	2552	8111	75.3	80.3	73.4	24.7	19.7	24.6
Mean	4072	1786	2418	8276	77.5	89.8	86.7	22.5	10.2	12.6

Association	Lbs. D.M. Per Acre - Alfalfa				Lbs. D.M. Per Acre- Grass			
	June 1	July 5	Aug 22	Total	June 1	July 5	Aug 22	Total
DuPuits + Lincoln	3761	2192	2589	8542	475	38	42	555
+ Climax	4008	2239	2747	8994	154	9	56	219
+ Frode	3372	2564	2590	8526	720	250	159	1129
Mean	3713	2332	2642	8687	450	99	86	634
Vernal + Lincoln	3173	1613	2012	6798	1240	177	268	1685
+ Climax	3412	1793	2389	7594	588	20	34	642
+ Frode	2864	1614	2096	6574	940	172	322	1434
Mean	3150	1673	2166	6989	923	123	208	1254

SEEDED: MAY 17, 1961 MIXTURE DIVERSITY TRIAL - 1961 (TEST 310) LOCATION: E-18

MEDIUM CUT - JUNE 13, 1962

Association	Lbs. D.M./Acre - Alfalfa + Grass				% Alfalfa			% Grass		
	June 13	July 24	Aug 22	Total	June 13	July 24	Aug 22	June 13	July 24	Aug 22
DuPuits + Lincoln	4866	2033	2294	9193	86.6	98.4	97.1	13.4	1.6	2.9
+ Climax	4916	2098	2262	9276	98.3	99.0	97.8	1.7	1.0	2.2
+ Frode	5321	1840	2223	9384	86.9	89.2	85.5	13.1	1.8	14.5
Mean	5035	1990	2260	9285	90.6	95.5	93.5	9.4	1.5	6.5
Vernal + Lincoln	5532	1616	1912	9060	67.8	85.8	87.9	32.2	14.2	12.1
+ Climax	4530	1591	2053	8174	93.5	98.8	95.7	6.5	1.2	4.3
+ Frode	5521	1545	1805	8871	78.8	78.2	79.3	21.2	21.8	20.7
Mean	5194	1584	1923	8701	80.0	87.6	87.6	20.0	12.4	12.4

Association	Lbs. D.M. Per Acre - Alfalfa				Lbs. D.M. Per Acre - Grass			
	June 13	July 24	Aug 22	Total	June 13	July 24	Aug 22	Total
DuPuits + Lincoln	4214	2000	2227	8441	652	33	67	752
+ Climax	4832	2077	2212	9121	84	21	50	155
+ Frode	4624	1641	1901	8166	697	199	322	1218
Mean	4557	1906	2113	8576	478	84	146	708
Vernal + Lincoln	3751	1387	1681	6819	1781	229	231	2241
+ Climax	4236	1572	1965	7773	294	19	88	401
+ Frode	4351	1208	1431	6990	1170	337	374	1881
Mean	4113	1389	1692	7194	1082	195	231	1508

SEEDED: MAY 17, 1961 MIXTURE DIVERSITY TRIAL - 1961 (TEST 310) LOCATION: E-18

LATE CUT - JULY 5, 1962

Association	Lbs. D.M./Acre, Alfalfa + Grass				% Alfalfa			% Grass		
	July 5	Aug. 1	Sept. 6	Total	July 5	Aug. 1	Sept. 6	July 5	Aug. 1	Sept. 6
DuPuits + Lincoln	5596	1782	2351	9729	88.8	98.0	94.8	11.2	2.0	5.2
+ Climax	4997	1483	2276	8756	96.5	100.0	97.3	3.5	0	2.7
+ Frode	5391	1670	2371	9432	90.2	95.7	92.5	9.8	4.3	7.5
Mean	5328	1645	2333	9306	91.8	97.9	94.9	8.2	2.1	5.1
Vernal + Lincoln	5749	1443	2083	9275	70.6	89.1	78.8	29.4	10.9	21.2
+ Climax	5228	1535	2083	8846	90.2	98.2	96.9	9.8	1.8	3.1
+ Frode	5453	1285	1898	8636	75.3	85.9	78.5	24.7	14.1	21.5
Mean	5477	1421	2021	8919	78.7	91.1	84.7	21.3	8.9	15.3

Association	Lbs. D.M. Per Acre - Alfalfa				Lbs. D.M. Per Acre - Grass			
	July 5	Aug. 1	Sept. 6	Total	July 5	Aug. 1	Sept. 6	Total
DuPuits + Lincoln	4969	1746	2229	8944	627	36	122	785
+ Climax	4822	1483	2215	8520	175	0	61	236
+ Frode	4863	1598	2193	8654	528	72	178	778
Mean	4885	1609	2212	8706	443	36	120	599
Vernal + Lincoln	4059	1286	1641	6986	1690	157	442	2289
+ Climax	4716	1507	2018	8241	512	28	65	605
+ Frode	4106	1104	1490	6700	1371	181	408	1960
Mean	4294	1299	1716	7309	1191	122	305	1618

Title Aftermath distribution of alfalfa and trefoil varieties.

Purpose To study the relationship among the dry matter aftermath production and the aftermath distribution from Vernal, DuPuits alfalfas and Viking, Empire, and Morshansk trefoils.

Exp. No. 4783

Location O.A.C. B7 (north end)

Date Seeded May 15, 1961

Design Split plot with four replications

Treatments 1. Species alfalfa - DuPuits 10 lb./acre
Vernal 10 lb/acre
trefoil - Empire 8 lbs./acre
Viking 8 lbs./acre
Morshansk 8 lbs./acre

2. Cutting Schedules
1st. Harvest (hay)
Hay removed from all varieties at medium to late bud.
2nd, 3rd, 4th Harvest
Aftermath growth curves were determined by cutting at 6", medium bud stage, and 1/10th bloom stages of development. Curves were only determined on aftermath from preceeding bud and 1/10th bloom harvests.

Key to harvest schedule
1st 1 = Bud
2nd & Succeeding
1 = 6"
2 = Bud
3 = 1/10th Bloom.

3. Heights of plants in centimeters were taken weekly. Stages of development were estimated weekly on the following basis.

A - Vegetative	E - Early Flower
B - Early Bud	F - Full Flower
C - Buds Emerged	G - Late Flower
D - Late Bud	H - Early Seed

Results (1962 Harvest)

Tables showing the dry matter yield, production per day, pounds of legume and grass (weeds) and per cent dry matter are shown for each variety. In addition graphs showing aftermath yield and height curves as well as tables for height are included.

The dry spring and summer of 1962 resulted in yields that were low. In particular the dry spell during the latter days of June and the first three weeks of July had a very marked delaying effect upon the growth of all varieties during the second aftermath recovery period. This was particularly true in the case where plots were previously harvested at the bud stage. As a result little difference in recovery time was

apparent as a result of cutting the first aftermath at bud or 1/10th bloom.

The first aftermath recovery was not effectual to the same degree as the second aftermath growth and the curves appeared to be "normal growth curves".

In all cases the dry matter production curves, production per day data, and stage indicated that when the plants reach a stage between vegetative and early bud the growth slows down.

Although the very dry mid summer period influenced the second aftermath distribution of the varieties the differences in aftermath harvest time among the varieties in all the aftermath harvests was a reflection of the date of harvest of the hay crop.

Effect of Date of Hay Harvest on the Distribution and Production Of Alfalfa and Trefoil Varieties Cut at Bud Stage

Variety	Hay Date	Hay Stage	Hay Yield	First Aftermath Date	First Aftermath Stage	First Aftermath Yield	Second Aftermath Date	Second Aftermath Stage	Second Aftermath Yield	Third Aftermath Date	Third Aftermath Stage	Third Aftermath Yield	Season Total
Viking +	May 23	C	2324	June 22	B	1377	July 19	B	360	Aug 31	B	1735	5796
DuPuits ++	25	AB	3646	27	BC	2129	27	BC	673	31	B	1303	7751
Morshansk	28	AB	2333	29	BC	1445	Aug. 27	BC	1687	—	-	—	5465
Vernal	30	A+	4293	July 6	BC	2265	14	C	1705	Oct 10	A	295	8558
Empire	June 8	C	3194	19	B	940	Aug. 31	B	1315	—	-	—	5449
	May 23°	A	1941	29	C	1967	Aug. 31	B	2906	—	-	—	6814

\+ Stage recorded on May 22 (8 days prior to cutting).
° One replication of Empire was cut prior to bud stage in the first hay crop.
++ An additional harvest on November 1 was made of DuPuits of 446 lb. Total yield for season 8192 lb.

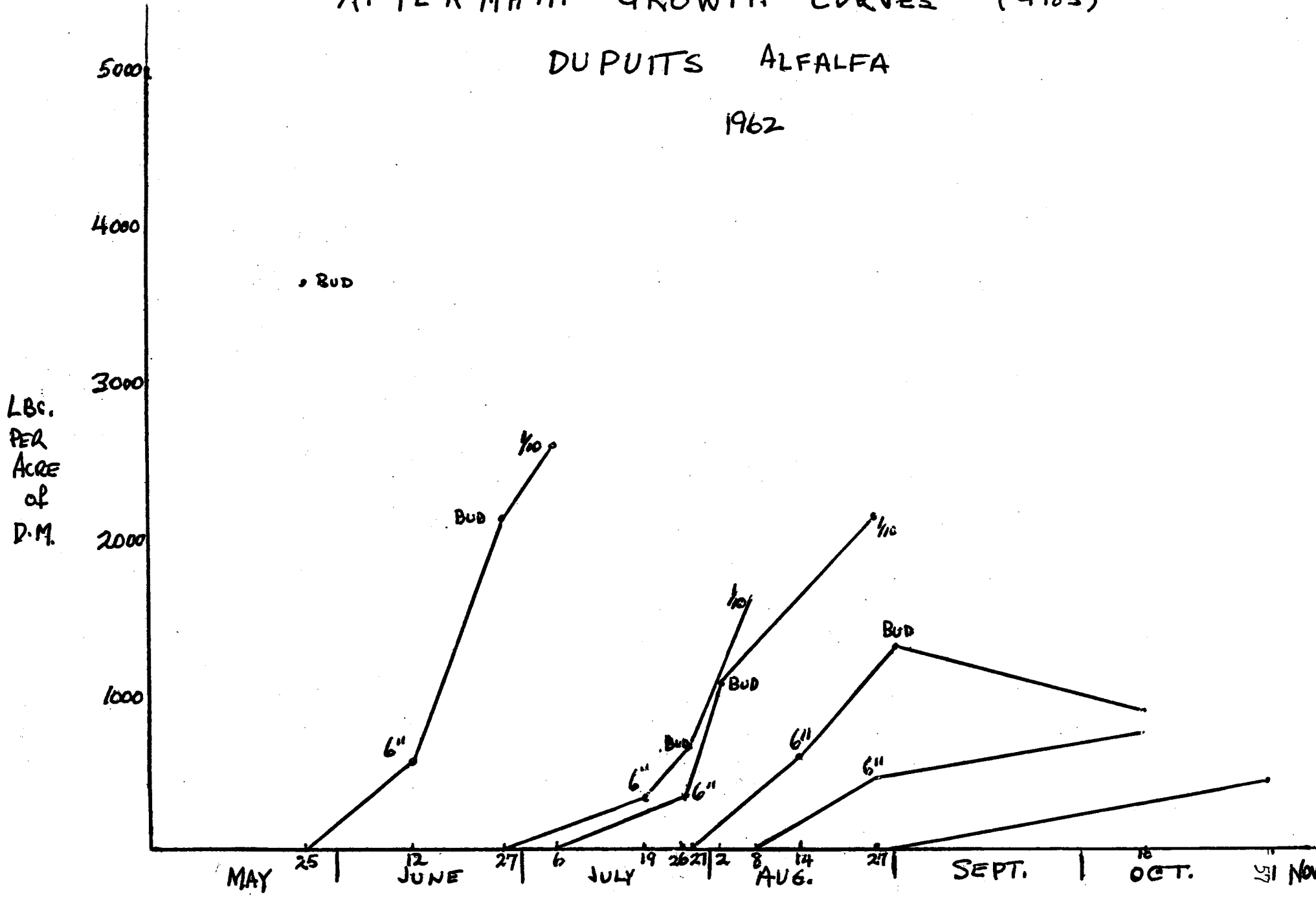
EXP. 4783 AFTERMATH GROWTH CURVES OF LUPUITS ALFALFA, 1961 O.A.C.
1962 Data

Treatment Cut 12345	Date of Cut	Date of Recording Hgt. & Stage	Stage of Plant Develop.	Height in Cms.	Yield in Lbs. D.M./Acre					% D.M.	Total Yield For Year
					Total	Prod'n Per Day	Legume	Grass	Weed		
1	May 25	May 22	AB	58.00	3646		3646	0	0	20.7	
11	June 12	June 12	A	21.98	564	31.3	564	0	0	20.2	4210
12	June 27	June 25	B	49.56	2129	64.5	2129	0	0	22.4	
13	July 6	July 4	D	56.25	2613	62.2	2613	0	0	35.5	
121	July 19	July 16	A	16.92	311	14.1	311	0	0	27.3	6086
122	July 27	July 24	BC	22.50	673	22.4	673	0	0	30.1	
123	Aug. 8	Aug. 8	D	39.50	1630	38.8	1630	0	0	24.8	
131	July 26	July 24	A	17.33	332	16.6	332	0	0	23.1	6591
132	Aug. 2	July 30	B	28.38	1060	39.3	1060	0	0	21.2	7319
133	Aug. 27	Aug. 27	E	49.75	2148	41.3	2148	0	0	41.2	8407
1221	Aug. 14	Aug. 13	A	22.00	602	33.4	602	0	0	19.8	7050
1222	Aug. 31	Aug. 27	B	34.13	1303	37.2	1303	0	0	34.0	7751
1223	Oct. 10	Oct. 10	C	34.50	899	12.0	899	0	0	31.1	7347
1231	Aug. 27	Aug. 27	A	17.88	459	24.2	459	0	0	30.5	7864
1232	Oct. 10	Oct. 10	B	23.00	733	11.6	733	0	0	28.4	8138
1222	Nov. 1	Oct. 22	A	21.75	446	7.2	446	0	0	20.2	8192

EXP. 4783/62 HEIGHTS IN CENTIMETERS - DUPUITS

Date	Treatment No. 1 11--	1 121-	1 1221	1 1222	1 1223	1 1231	1 1232	1 131-	1 132-	1 133-
May 22	58.00	58.00	58.00	58.00	58.00	58.00	58.00	58.00	58.00	58.00
June 5	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63
June 12	21.98	21.98	21.98	21.98	21.98	21.98	21.98	21.98	21.98	21.98
June 18		35.03	35.03	35.03	35.03	35.03	35.03	35.03	35.03	35.03
June 25		49.56	49.56	49.56	49.56	49.56	49.56	49.56	49.56	49.56
July 4		5.00	5.00	5.00	5.00	5.00	5.00	56.25	56.25	56.25
July 9		10.71	10.71	10.71	10.71	10.71	10.71	5.00	5.00	5.00
July 16		16.92	16.92	16.92	16.92	16.92	16.92	8.17	8.17	8.17
July 24			22.50	22.50	22.50	22.50	22.50	17.33	17.33	17.33
July 30			5.00	5.00	5.00	27.38	27.38		28.38	28.38
Aug. 8			18.00	18.00	18.00	39.50	39.50			42.50
Aug. 13			22.00	22.00	22.00	5.00	5.00			45.50
Aug. 22				32.50	32.50	12.88	12.88			49.75
Aug. 27				34.13	34.13	17.88	17.88			49.75
Sept. 3				5.00	36.25		22.25			
Sept. 10				5.25	33.50		22.50			
Sept. 17					33.75		22.75			
Sept. 24					34.00		23.25			
Oct. 2					34.25		23.50			
Oct. 10					34.50		23.00			
Oct. 15				21.25						
Oct. 22				21.75						

AFTER MATH GROWTH CURVES (4783)



EXP. 4783

AFTERMATH GROWTH CURVES OF VERNAL ALFALFA 1961
1962 Data

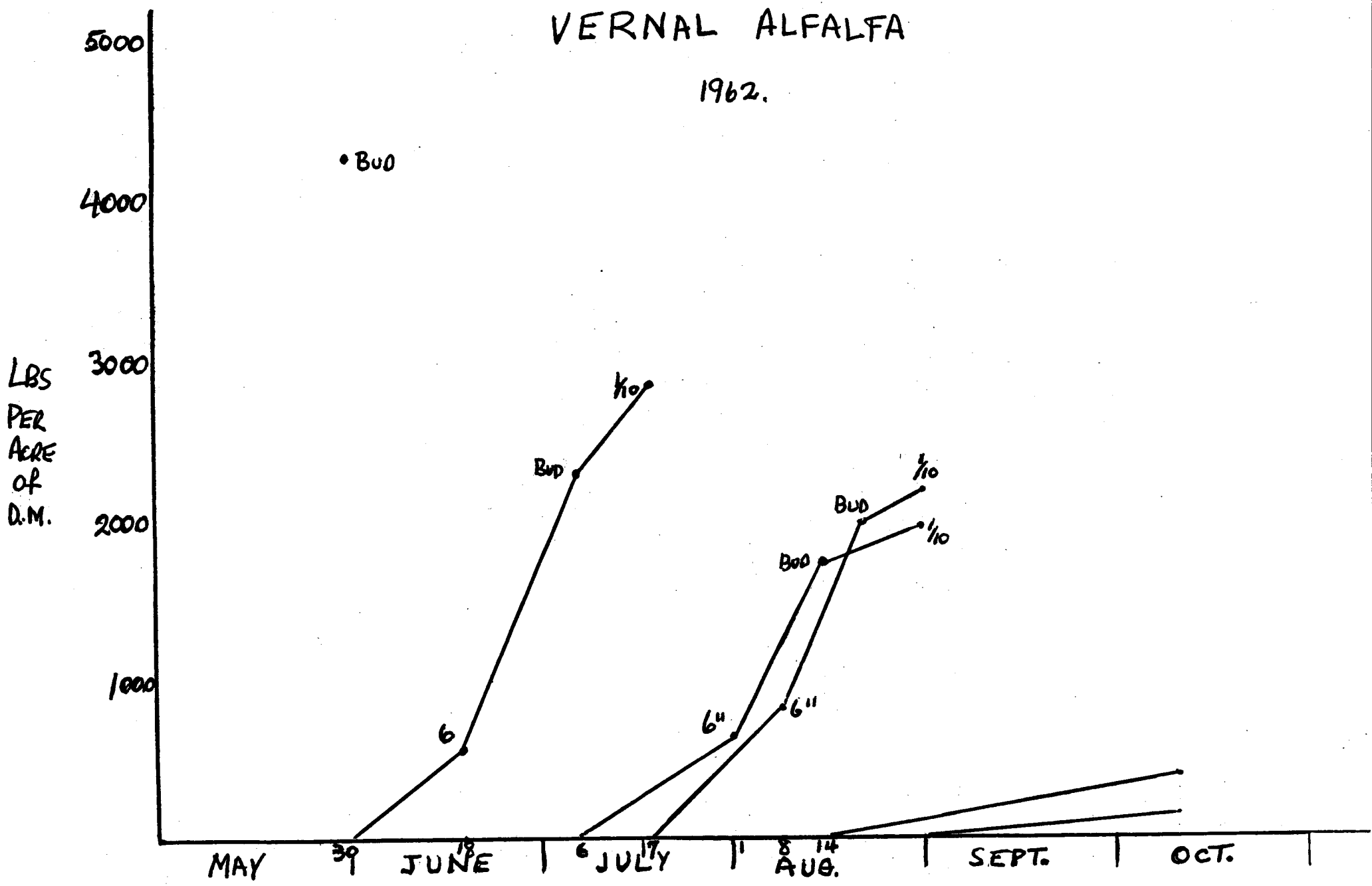
O.A.C.

Treatment Cut 12345	Date of Cut	Date of Recording Hgt. & Stage	Stage of Plant Develop.	Height in Cms.	Yield in Lbs. D.M./Acre						Tot. Yield for Year
					Total	Prod'n Per Day	Legume	Grass	Weed	DM.	
1	May 30	May 22	A	52.60	4293		4293	0	0	23.1	
11	June 18	June 18	A	22.12	580	30.5	580	0	0	19.7	4873
12	July 6	July 4	BC	44.78	2265	61.2	2265	0	0	32.2	
13	July 17	July 16	C	52.34	2842	59.2	2842	0	0	33.7	
121	Aug. 1	July 30	A	19.50	618	23.8	618	0	0	22.2	7176
122	Aug. 14	Aug. 13	C	37.05	1705	43.7	1705	0	0	23.4	
123	Aug. 31	Aug. 27	D	41.88	1944	34.7	1944	0	0	40.1	
131	Aug. 8	Aug. 8	A	28.42	817	37.1	817	0	0	18.7	7952
132	Aug. 21	Aug. 13	C	36.13	1965	56.1	1965	0	0	25.5	9100
133	Aug. 31	Aug. 27	CD	44.75	2185	48.6	2185	0	0	36.7	9320
1221	Oct. 10	Oct. 10	A	11.58	395	6.9	395	0	0	25.5	8658
1222	Oct. 10	Oct. 10	A	11.58	295	5.2	295	0	0	26.9	8558
1223	Oct. 10	Oct. 10	A	11.58	214	3.8	214	0	0	30.9	8477
1231	Oct. 10	Oct. 10	A	10.00	156	3.9	156	0	0	24.8	8658
1232	Oct. 10	Oct. 10	A	10.00	133	3.3	133	0	0	24.6	8653

EXP. 4783/62 HEIGHT IN CENTIMETERS - VERNAL

Date	Treatment No. 2 11--	2 121-	2 1221	2 1222	2 1223	2 1231	2 1232	2 131-	2 132-	2 133-
May 22	52.60	52.60	52.60	52.60	52.60	52.60	52.60	52.60	52.60	52.60
June 5	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
June 12	10.68	10.68	10.68	10.68	10.68	10.68	10.68	10.68	10.68	10.68
June 18	22.12	22.12	22.12	22.12	22.12	22.12	22.12	22.12	22.12	22.12
June 25		35.81	35.81	35.81	35.81	35.81	35.81	35.81	35.81	35.81
July 4		44.78	44.78	44.78	44.78	44.78	44.78	44.78	44.78	44.78
July 9		5.00	5.00	5.00	5.00	5.00	5.00	47.50	47.50	47.50
July 16		6.33	6.33	6.33	6.33	6.33	6.33	52.34	52.34	52.34
July 24		12.00	12.00	12.00	12.00	12.00	12.00	5.00	5.00	5.00
July 30		19.50	19.50	19.50	19.50	19.50	19.50	8.67	8.67	8.67
Aug. 8			33.40	33.40	33.40	33.40	33.40	28.42	28.42	28.42
Aug. 13			37.05	37.05	37.05	37.05	37.05		36.13	36.13
Aug. 22			5.00	5.00	5.00	41.75	41.75			43.75
Aug. 27			9.00	9.00	9.00	41.88	41.88			44.75
Sept. 3			10.92	10.92	10.92	5.00	5.00			
Sept. 10			11.42	11.42	11.42	5.00	5.00			
Sept. 17			12.33	12.33	12.33	6.63	6.63			
Sept. 24			12.50	12.50	12.50	6.75	6.75			
Oct. 2			12.50	12.50	12.50	7.75	7.75			
Oct. 10			11.58	11.58	11.58	10.00	10.00			

AFTERMATH GROWTH CURVES (4783)



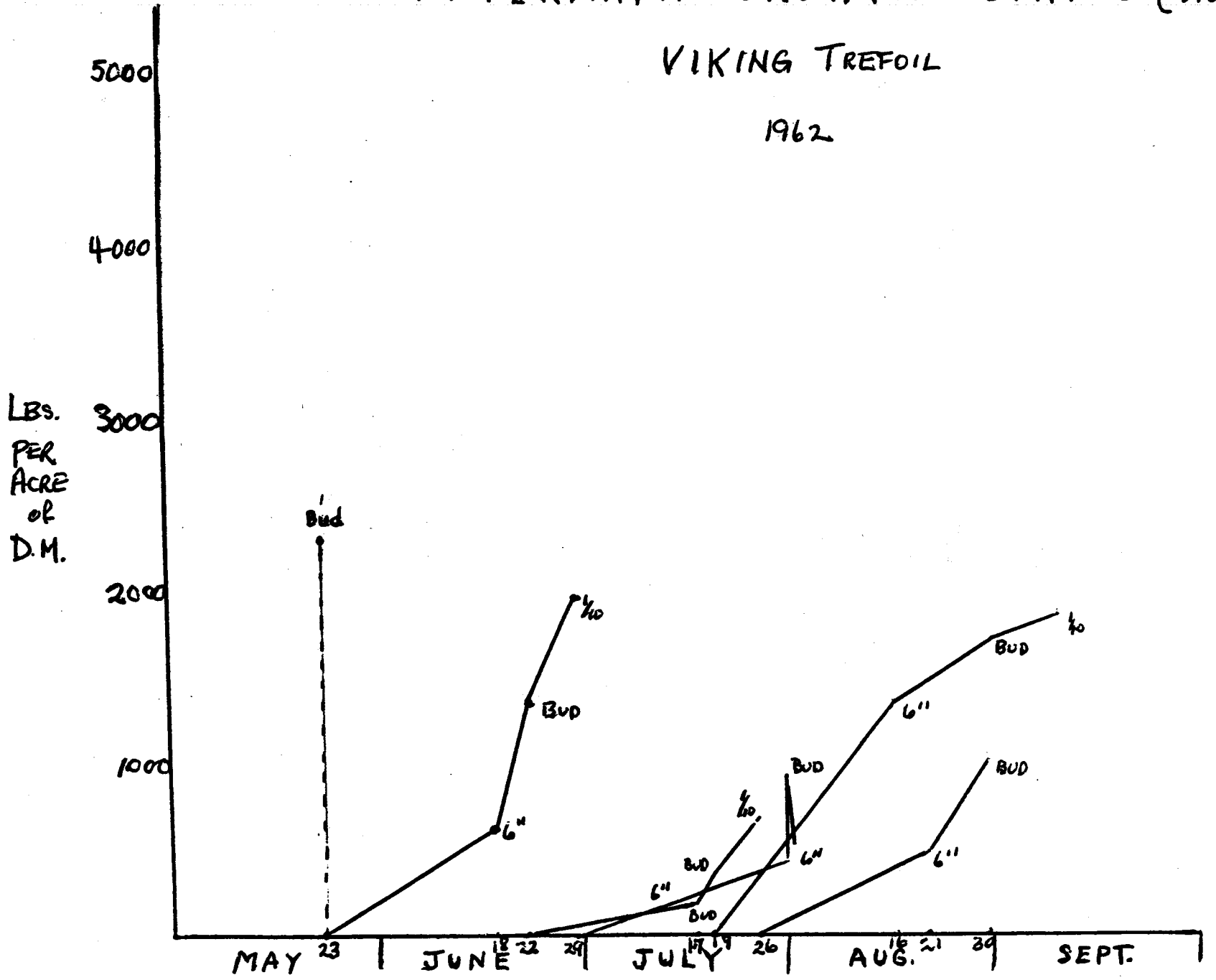
EXP. 4783 AFTERMATH GROWTH CURVES OF VIKING TREFOIL, 1961 O.A.C.
1962 Data

Treatment Cut 12345	Date of Cut	Date of Recording Hgt. & Stage	Stage of Plant Develop.	Height in Cms.	Yield in Lbs. of D.M./acre Total	Prod'n Per Day	Legume	Grass	Weed	% D.M.	Total Yield For Year
1	May 23	May 22	C	28.60	2324		2132	22		17.7	
11	June 18	June 18	AB	20.50	702	27.0	678	30		15.3	3026
12	June 22	June 18	B	20.50	1377	45.9	1364	13		15.6	
13	June 29	June 25	BC	28.75	1976	53.4	1857	61		18.9	
121	July 17	July 16	AB	13.25	197	7.9	194	2		24.8	3898
122	July 19	July 16	B	13.25	360	13.3	347	10		28.7	
123	July 26	July 24	D	15.50	681	20.0	656	15		23.3	
131	July 31	July 30	CD	17.33	407	12.7	400	5		22.9	4707
132	July 31	July 30	CD	17.33	927	29.0	919	6		22.2	5227
133	Aug. 1	July 30	CD	17.33	532	16.1	521	8		21.3	4832
1221	Aug. 16	Aug. 13	AB	19.92	1360	48.6	1299	40		24.8	5421
1222	Aug. 31	Aug. 27	B	27.25	1735	40.3	1599	136		30.1	5796
1223	Sept 12	Sept 10	BC	28.00	1884	34.3	1786	75		27.7	5945
1231	Aug. 21	Aug. 13	AB	13.38	489	18.8	470	16		20.5	4871
1232	Aug. 30	Aug. 27	AB	22.00	1011	28.9	974	37		30.9	5393

EXP. 4783/62 HEIGHTS IN CENTIMETERS VIKING

Tst.	No.	May 22	June 5	June 12	June 18	June 25	July 4	July 9	July 16	July 24	July 30	Aug 88	Aug 13	Aug 22	Aug 27	Sept 3	Sept 10
3	11--	28.60	7.75	11.80	20.50												
3	121-	28.60	7.75	11.80	20.50	5.00	7.12	10.75	13.25								
3	1221	28.60	7.75	11.80	20.50	5.00	7.12	10.75	13.25	5.00	7.17	14.67	19.92				
3	1222	28.60	7.75	11.80	20.50	5.00	7.12	10.75	13.25	5.00	7.17	14.67	19.92	26.38	27.25		
3	1223	28.60	7.75	11.80	20.50	5.00	7.12	10.75	13.25	5.00	7.17	14.67	19.92	26.38	27.25	29.00	28.00
3	1231	28.60	7.75	11.80	20.50	5.00	7.12	10.75	13.25	15.50	5.50	10.13	13.38				
3	1232	28.60	7.75	11.80	20.50	5.00	7.12	10.75	13.25	15.50	5.50	10.13	13.38	21.50	22.00		
3	131-	28.60	7.75	11.80	20.50	28.75	5.00	6.00	8.42	13.17	17.33						
3	132-	28.60	7.75	11.80	20.50	28.75	5.00	6.00	8.42	13.17	17.33						
3	133-	28.60	7.75	11.80	20.50	28.75	5.00	6.00	8.42	13.17	17.33						

AFTERMATH GROWTH CURVES (4783)



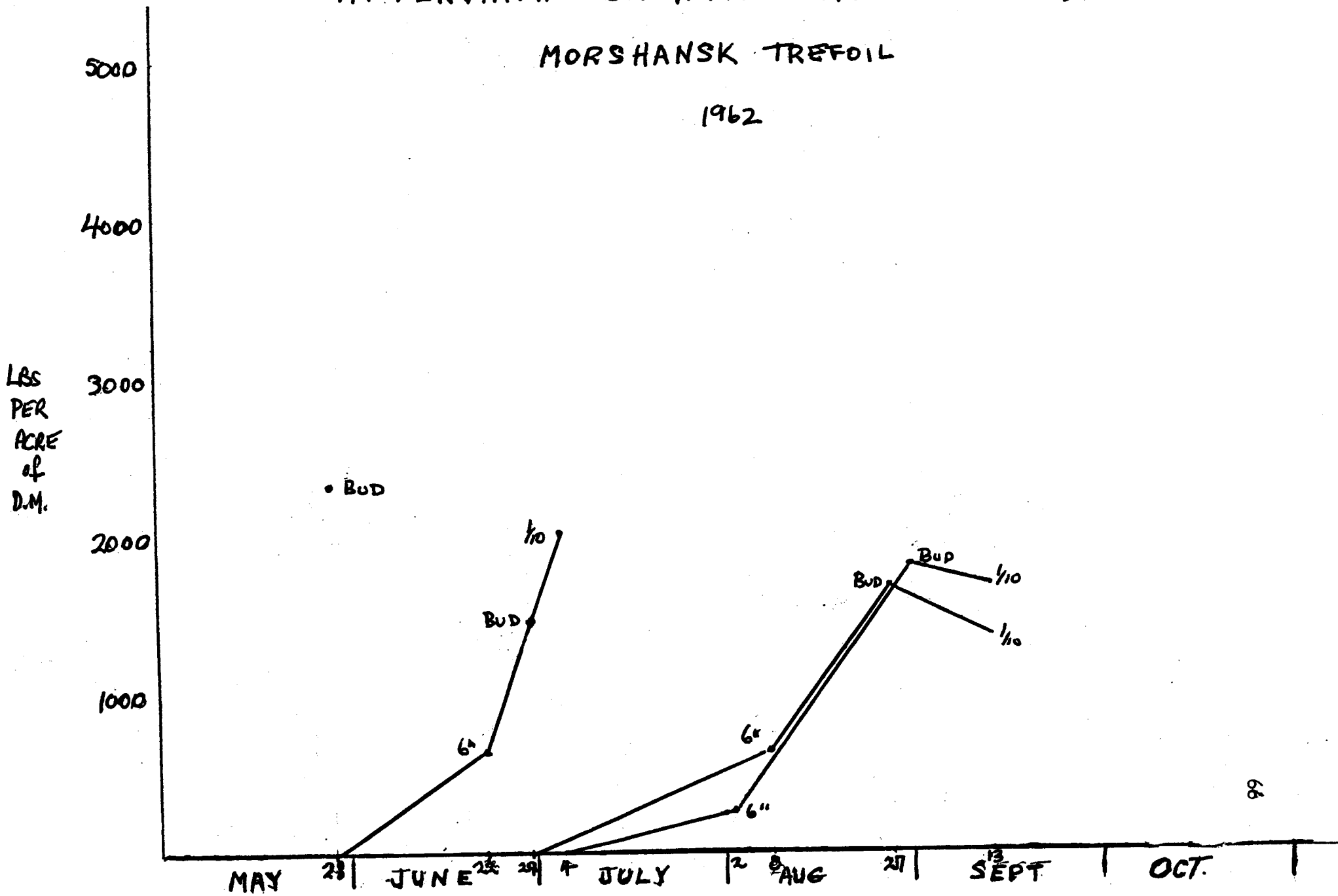
EXP. 4783 AFTERMATH GROWTH CURVES OF MORSHANSK TREFOIL TREFOIL, 1961 O.A.C.
1962 Data

Treatment Cut 12345	Date of Cut	Date of Recording Height & Stage	Stage of Plant Develop.	Height in Cms.	Yield in Lbs. D.M./Acre					% D.M.	Total Yield For Year
					Total	Prod'N Per Day	Legume	Grass	Weed		
1	May 28	May 22	AB	27.00	2333		2242	91		18.3	
11	June 22	June 18	AB	13.33	644	25.8	625	19		15.7	2977
12	June 29	June 25	C	24.00	1445	45.2	1404	38		18.0	
13	July 4	July 4	DE	34.25	2032	54,9	2005	18		24.1	
121	Aug. 8	Aug. 8	B	19.84	639	16.0	621	16		20.4	4417
122	Aug. 27	Aug. 27	BC	28.20	1687	28.6	1630	57		31.4	5465
123	Sept. 13	Sept. 10	C	28.25	1396	18.4	1380	16		33.6	5174
131	Aug. 2	July 30	AB	11.75	253	8.7	248	6		21.3	4618
132	Aug. 31	Aug. 27	B	32.25	1836	31.7	1836	0		32.4	6201
133	Sept. 13	Sept. 10	B	31.00	1702	24.0	1663	40		28.5	6067
1221		——									
1222		——									
1223		——									
1231		——									
1232		——									

EXP. 4783/62 HEIGHT IN CENTIMETERS -- MORSHANSK

Tst. No.	May 22	June 5	June 12	June 18	June 25	July 4	July 9	July 16	July 24	July 30	Aug 8	Aug 13	Aug 22	Aug 27	Sept 3	Sept 10
5 11—	27.00	5.00	7.18	13.33												
5 121-	27.00	5.00	7.18	13.33	24.00	5.00	5.50	7.25	8.63	11.33	19.84					
5 1221	27.00	5.00	7.18	13.33	24.00	5.00	5.50	7.25	8.63	11.33	19.84	23.70	28.15	28.20		
5 1222	27.00	5.00	7.18	13.33	24.00	5.00	5.50	7.25	8.63	11.33	19.84	23.70	28.15	28.20		
5 1223	27.00	5.00	7.18	13.33	24.00	5.00	5.50	7.25	8.63	11.33	19.84	23.70	28.15	28.20		
5 1231	27.00	5.00	7.18	13.33	24.00	5.00	5.50	7.25	8.63	11.33	19.84	23.70	28.15	28.20	28.88	28.25
5 1232	27.00	5.00	7.18	13.33	24.00	5.00	5.50	7.25	8.63	11.33	19.84	23.70	28.15	28.20	28.88	28.25
5 131-	27.00	5.00	7.18	13.33	24.00	34.25	5.00	6.25	8.25	11.75						
5 132	27.00	5.00	7.18	13.33	24.00	34.25	5.00	6.25	8.25	11.75	22.25	27.13	32.38	32.25		
5 133-	27.00	5.00	7.18	13.33	24.00	34.25	5.00	6.25	8.25	11.75	22.25	27.13	32.38	32.25	32.50	31.00

AFTERMATH GROWTH CURVES (4783)



EXP. 4783 AFTERMATH GROWTH CURVES OF EMPIRE TREFOIL, 1961 O.A.C. (Reps 1,3,4)

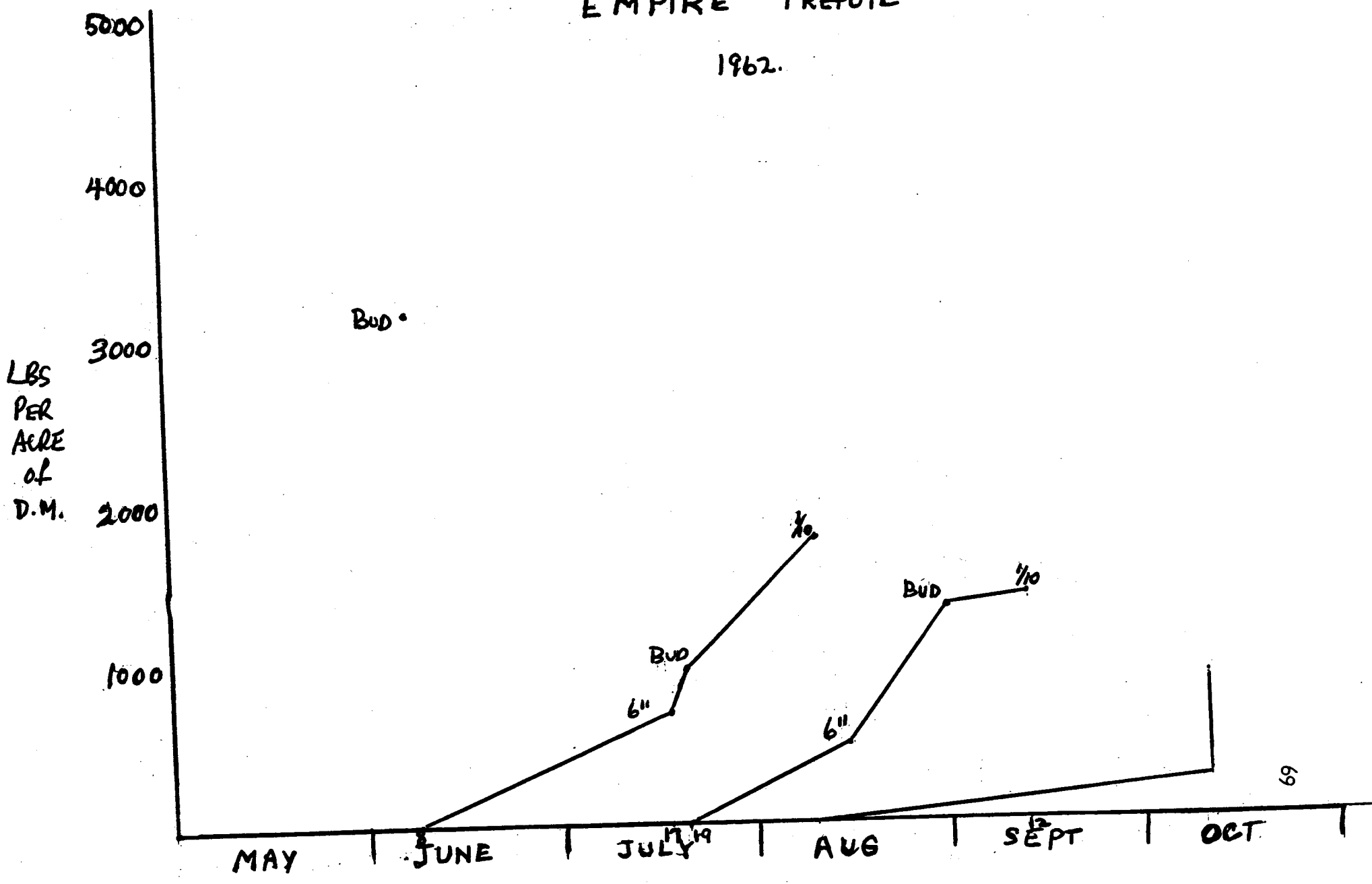
1962 Data

Treatment Cut 12345	Date of Cut	Date of Recording Height & Stage	Stage of Plant Develop.	Height in Cms.	Yield in Lbs. D.M./Acre					% D.M.	Total Yield For Year
					Total	Prod'n Per Day	Legume	Grass	Weed		
1	June 8	June 5	C	38.73	3194		2791	234		23.6	
11	July 17	July 16	AB	15.80	684	17.5	627	14		33.1	3878
12	July 19	July 16	B	15.80	940	22.9	839	29		35.7	
13	Aug. 7	July 30	CD	20.67	1740	29.0	1609	65		23.3	4934
121	Aug. 14	Aug. 13	A	14.28	470	18.1	432	15		17.1	4604
122	Aug. 31	Aug. 27	B	21.73	1315	30.6	1254	42		33.8	5449
123	Sept. 12	Sept. 10	A	22.50	1372	24.9	1256	60		29.6	5506
131	Oct. 10	Oct. 10	A	9.33	223	3.5	187	45		25.0	5157
132	Oct. 10	Oct. 10	A	9.33	873	13.6	60	39		25.8	5807
133		—									
1221		—									
1222		—									
1223		—									
1231		—									
1232		—									

EXP. 4783/62 HEIGHTS IN CENTIMETERS EMPIRE - Reps 1,3,4.

Date	4 11—	4 121-	4 1221	4 1222	4 1223	4 1231	4 1232	4 131-	4 132-	4 133-
May 22	25.10	25.10	25.10	25.10	25.10	25.10	25.10	25.10	25.10	25.10
June 5	38.73	38.73	38.73	38.73	38.73	38.73	38.73	38.73	38.73	38.73
June 12	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
June 18	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
June 25	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44
July 4	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47
July 9	14.57	14.57	14.57	14.57	14.57	14.57	14.57	14.57	14.57	14.57
July 16	15.80	15.80	15.80	15.80	15.80	15.80	15.80	15.80	15.80	15.80
July 24		5.00	5.00	5.00	5.00	5.00	5.00	14.78	14.78	14.78
July 30		6.95	6.95	6.95	6.95	6.95	6.95	14.33	14.33	14.33
Aug. 8		10.61	10.61	10.61	10.61	10.61	10.61	5.67	5.67	20.67
Aug. 13		14.28	14.28	14.28	14.28	14.28	14.28	6.00	6.00	23.33
Aug. 22			21.00	21.00	21.00	21.00	21.00	7.34	7.34	5.00
Aug. 27			21.73	21.73	21.73	21.73	21.73	8.67	8.67	5.00
Sept. 3						22.17	22.17	9.00	9.00	5.00
Sept. 10						22.50	22.50	8.84	8.84	5.00
Sept. 17								9.17	9.17	5.33
Sept. 24								9.34	9.34	5.33
Oct. 2								9.50	9.50	5.33
Oct. 10								9.33	9.33	5.33

AFTERMATH GROWTH CURVES (4783)



Progress Report
Using the In Vitro Technique
For Quality Evaluation of Crops

The materials, equipment, solutions, and procedure used in this technique are outlined in the 1961 Forage Management Progress Report of this department.

The In Vitro technique used in quality evaluation is based upon that developed at the Hurley Grassland Station and reported in Proc. 8th Inter. Grass Cong. 1960 Report. The digestibility of a sample is gauged on the decrease in dry matter rather than cellulose. Thus, chemical determinations of cellulose content on the sample prior to addition of the micro-organisms and on the residue after digestion is eliminated. However, very precise weighing of the samples is required before and after digestion using this dry matter technique.

In this laboratory, the total digestion of the sample is estimated. Digestion alone is only one factor involved in quality evaluation of crops. However, error terms involved in determining the more desirable criterion of value; the nutritive value index (relative intake x digestion) by an In Vitro technique are high.

Table 1: Calibration of Artificial Rumen With Standard Samples
Per Cent Digestible Dry matter

Period of Digestion	G 611 (O.A.C. Alfalfa)	Purdue	Macdonald Brome	Macdonald Alfalfa
12	44.4	32.8	20.3	36.5
24	57.0	41.3	43.9	47.0
36	59.9	47.2	53.2	51.5
48	63.9	52.3	59.5	54.8
48 + 48	73.4	55.7	61.0	61.1

Analysis of Variance Table
Mean Squares

Variants	df.	24	48 + 48
Runs	2	13.60**	15.50**
Substrate	2	50.06**	47.08**
R x S	4	2.52	3.12
Error	8	1.39	0.89
s.		1.10	0.94

Justification for acceptance of the criterion of total digestion is in the fact that the one factor restricting the use of forage as a complete livestock feed is energy. In general, forages will contain adequate protein and also sufficient minerals if the crop has been grown under an adequate and well balanced fertility program for animal nutrition.

The use of total digestion (as indicated in this case by digestible dry matter) in order to "sort out" the effect of management practices, differences among species and varieties, etc., on the energy value of crops has a very meaningful objective. When relating these data to livestock performance, the same problems and difficulties are encountered as when other energy values are used. In particular the resulting data are useful in computing rations for livestock or when animals are on a restrictive feeding program. In general, however, these data can be utilized within limits to indicate the total quality of feed. For where botanical composition remains constant (such as in stands of pure alfalfa or grass or in mixtures where the proportion of the components remain the same), intake is related to digestibility where the digestibility values are medium to high.

Thus, two lines of research are suggested by the above. 1) The determination of the effect of agronomic practices, species and varieties on the energy content of forage and 2) the investigation into the use of In Vitro techniques for estimating total quality of crops.

The former line of research is well underway in this laboratory. The laboratory has been equipped and staffed for the evaluation of approximately 10,000 samples per year. It is essential in this field to make certain that every run estimates the In Vivo digestion. This is accomplished by using "standard samples" in every run. Standard samples such as Macdonald alfalfa and bromegrass have known In Vivo digestion ratings and are used in every run along with an O.A.C. standard alfalfa (G61-1). The relationship between results obtained with the In Vitro technique and the In Vivo data is shown in the accompanying table.

Table 2: Relationship Between In Vitro and In Vivo Digestion

O.A.C., Guelph

% D.D.M.

Sample	In Vitro+	In Vivo
Purdue Alfalfa	55.7	55.1°
Macdonald Alfalfa	61.1	60.0
Ottawa Brome 4602-B	70.5	71.8
Ottawa Brome 449-7	62.9	58.7
Ottawa Alfalfa 482-3B	74.1	73.1
Ottawa Alfalfa 482-2B	57.8	58.8

\+ Average of two runs

° In Vivo data for Purdue sample actually In Vitro data determined at Purdue.

Although no correlations can be made between these two sets of data (limited In Vivo data) there appears to be a close relationship between In Vitro and In Vivo digestibility using this technique under our laboratory conditions. The O.A.C. alfalfa (G61-1) has become our basic standard sample for calibration of each run, and also for research into technology of techniques and components. No In Vivo digestibility data are available for this sample. However, limited data are available concerning its animal acceptance. Intake trials using forage produced at Brampton were conducted in 1961 on sixteen samples (including G61-1) of hay. The yield, stage, date, digestible dry matter and the In Vivo data are shown in the accompanying table (table 3). Digestion and protein values are also given for three Animal Husbandry hays that were used in a dairy cattle intake trial in 1961.

Table 3: Sheep Hays Brampton, 1961

No.	Date of Cut	Stage	lb. Yield	Per Cent D.D.M.	Per Cent Water Sol.	% Crude Protein	% Ash.	In Vivo Intake° gms./.75	In Vivo wgt. gain per day
Vernal Alfalfa									
G611	5-16	Vegetative	2912	75.3	36.3	20.5	12.44	80.6	+0.48
G612	5-30	Early Bud	4313	69.4	30.5	17.3	10.78	65.6	+0.39
G613	6-14	1st Flower	4851	62.2	27.7	17.4	7.90	67.0	+0.26
G614	6-27	E. Seed	4826	62.0	19.3	15.3	7.84	54.3	+0.24
Saratoga Brome									
G619	5-16	Boot	1887	79.9	31.7	14.6	9.02	85.9	+0.45
G6110	5-30	Head	3597	69.8	19.1	10.9	7.71	67.7	+0.23
G6111	6-14	Late Flower	4959	68.6	18.7	7.7	6.32	44.0	+0.00
G6112	6-27	E. Seed	5025	58.8		5.7	5.80	49.0	+0.03
Climax Timothy									
G615	5-16	Joint	2510	78.7	25.4	16.2	9.56	77.3	+0.45
G616	5-30	Boot	4096	72.5	20.4	11.9	9.12	64.1	+0.31
G617	6-14	Head	5632	59.0	19.3	11.2	7.62	47.1	+0.00
G618	6-27	Flower	5985	54.2	18.3	8.0	6.08	33.6	-0.07
Frode Orchard									
G6113	5-16	Boot	1502	75.3	33.0	12.7	10.95	80.1	+0.56
G6114	5-30	Flower	2435	70.1	25.3	9.4	11.42	68.9	
G6115	6-14	L. Flower	3539	62.6	20.9	8.3	8.60	58.8	+0.30
G6116	6-27	Seed	3658	58.7	19.1	7.5	9.57	55.4	+0.14
Animal Husbandry Hays 1961 (Dairy Cows)									
AHBS1	6-6			70.2		18.5		41.1 +	+ .11
AHBS2	6-27			68.0		17.0		32.9	+ .28
AHBS3	7-18			59.8		12.3		21.9	- .68

\+ Consumption in pounds per day per cow.
° Intake in grams per metobolic weight (sheep).

In a former report mention was made of the fact that the use of Pepsin was not necessary for the estimation of digestibility in grasses but was necessary for legumes.

Table 4: Use of Pepsin in the Digestibility of Forages
Per Cent Digestible Dry Matter

Sample	Period of Digestion	Average Digestion Four Runs+	Three Runs°
G611	48	66.1	60.9
	48+48	73.5	73.1
G619	48	76.0	73.1
	48+48	79.3	79.9
MacBrome	48	63.1	--
	48+48	59.3	--

+ runs 23, 31, 32, and 35 period - up to June 10, 1962.
° runs 50, 62, 70 period - after October 3, 1962.

Period 1. Ration for sheep chopped $\frac{3}{4}$" to 1". - 75% alfalfa hay Brampton harvested 1961.
- 25% grass Brampton harvested 1961.
D.D.M. 75.3%.

2. Ration for sheep chopped $\frac{3}{4}$" to 1". - 80% alfalfa hay O.A.C. Animal Husbandry Dept., 1961.
20% straw (small proportion of grass).
D.D.M. 70.2%.

Recent indications are that the ration used for feeding the fistulated sheep may have a bearing on the use of pepsin. Where sheep were fed a ration of approximately 75% alfalfa and 25% grass, the pepsin was not necessary for estimating digestibility of grasses. Where alfalfa was fed accompanied by little or no grass, the pepsin digestion period was required for estimating digestion of both species.

Using any In Vitro technique a variability exists between two runs using the same samples. In order to overcome this, it has been the practice of this laboratory to use two runs of the same material and average the digestibilities. However, in many cases a run x treatment interaction occurs. It was essential to determine the type of interaction that occurred. Thus three runs were made of a management study to determine the type of interaction.

Table 5: Interaction Between Runs x Treatments

Cut	Run Number 40	52	58	Average
1	50.5 e	46.7 cd	52.4 d	49.9
2	67.1 a	64.3 a	70.0 a	67.1
3	73.4 a	68.5 a	75.0 a	72.3
4	74.3 a	68.5 a	74.2 a	72.3
5	67.6 ab	62.9 ab	70.0 ab	66.8
6	64.6 b	52.3 bc	66.0 bc	61.0
7	62.8 bc	48.8 c	64.3 cd	58.6
8	56.4 cd	39.3 de	56.0 d	50.6
9	54.4 d	34.0 e	52.9 d	47.1
10	51.8 de	37.0 e	51.6 d	46.8
11	48.1 e	33.0 e	47.7 d	43.0
12	43.7 e	32.3 e	47.4 d	41.1
Standard	59.6	62.9	67.7	63.4
Time From Feed	14.3 hrs.	5.0 hrs.	16.0 hrs.	
pH of R.L.	7.0	7.0	7.3	

Analysis of Variance Table

Variant	d.f.	M.S.
Runs	2	1985-33**
Replications	3	21-59**
Runs x Reps.	6	0.84
Cutting Dates	11	1553-53**
Cuts x Runs	22	41-96*
Error B	99	12-84

A run x treatment interaction was apparent. However, by the use of Duncan's Multiple Range test within each run and a comparison of these across the runs is evident that the interaction was due to a change in magnitude (Run 52) and not in ranking of the individual treatments. These data plus others indicate that the technique is ranking the treatment in the correct order in every run, but that two runs are necessary to obtain a valid estimate of digestibility.

It is also important to know the number of replications of the field trial as well as the number of tubes per sample that should be used to estimate the digestibility. Analyses were made of material that had been processed through the In Vitro technique.

Table 6: Analysis of Variance Table

	d.f.	Mean Squares Saratoga	Canadian Brome	
Reps.	3	23.34	13.07	
Cuts	11	450.20	345.81	$6s^2+2\epsilon e^2+4\epsilon^2$
Reps. x Cuts	33	14.84	14.69	$6s^2+2\epsilon e^2$
Sample Error	48	2.71	3.48	ϵe^2
Predicted Standard Error				
for 2 samples 4 reps.		1.86	1.84	
1 sample 4 reps.		2.20	2.27	
1 sample 6 reps.		1.46	1.52	

The prediction values indicated that the use of one tube for each of four field replications would result in a very high standard error. Standard errors of the various combinations of number of tubes and replications indicated that one tube from each of six replications would result in the lowest error. However, at the present two samples of 4 replications are being used as the error term is only slightly larger than where 1 sample is used with 6 replications and less work is involved in using this number.

Samples from many agronomic studies such as first and aftermath growth curves experiments, mixture diversification trials, strain and species comparisons are being processed in the laboratory. One of the underlying projects of all these studies is to determine that the value of the leaf stem proportions in terms of digestibility. In one study conducted at Kemptville with two varieties of trefoil, leaf and stem were separated and digestion trials were conducted. (Table 7)

Although these are preliminary studies, the data indicate that Empire stems tend to be lower in digestibility than Viking stems but that the leaves of Empire are higher in digestibility than the Viking stems. In addition, the digestibility of the stems gradually decrease with increasing maturity of the crop. Whereas, the leaves remain fairly constant in digestibility until seed stage is reached. This is particularly the case with Empire.

The second phase of the program concerned with quality of crops is that of attempting to obtain a method by which the overall feeding quality can be estimated with the proviso that it will eliminate much of the variability among runs. This suggests that the technique must be chemical rather than biological.

The concept of determining NVI by an In Vitro technique is based upon information that indicate a lag in early digestion period occurs with some samples and that this lag in digestion is related to intake. The lag in digestion suggests that components within the crops in question may vary and that if the above thesis is true, they differ markably in digestion; thus,"loading the gut" and reducing intake. Thus, chemical determinations of components of different species varieties and their maturity are essential.

A program was undertaken in order to achieve the above objectives. It involves investigation into components of forage and their digestibility. Work is proceeding in the fractionation of the components into four broad groups:

Table 7: TREFOIL DEVELOPMENT STUDY KEMPTVILLE, 1961

Cutting Date	Stage of Development	Plant Height (inches)	Yield in Lbs.DM/A.	% D. D. M.	% Leaves	% D. D. M.	% Stems	% D. D. M.
Viking								
May 31	Vegetative	11.4	1245	74.1	74.9	73.7	25.1	74.5
June 8	1st Flower	19.1	2186	67.2	59.1	66.4	40.9	68.0
June 16	Full Blossom	20.0	2987	66.9	47.5	70.8	52.5	63.1
June 23	Late Bud	24.4	3488	62.6	44.7	67.9	55.3	57.2
June 29	Pods & Fl.	28.8	3162	65.6	39.3	70.7	60.7	60.5
July 7	Late Blossom	31.3	4002	61.4	33.5	65.3	66.5	57.5
July 14	Seed	35.2	4197	56.4	29.6	60.7	70.4	52.2
Empire								
June 9	Vegetative	13.5	1045	73.9	68.0	81.5	32.0	66.4
June 16	L. Bud	19.2	2034	70.1	51.1	78.4	48.9	61.8
June 23	E. Bloom	22.5	2836	69.5	50.5	75.0	49.5	53.9
June 29	Flower	30.3	2973	68.0	43.7	81.5	56.3	54.5
July 7	E. Pod	33.7	3499	61.6	40.8	76.1	59.2	47.1
July 14	M. Pod	37.2	3359	61.9	31.5	73.2	68.5	50.5
July 21	Seeds	38.8	3027	57.3	23.1	65.8	76.9	48.9

1) water soluble material, 2) material made soluble by cellulase, 3) pepsin, and 4) residue. These studies are not completed but the fractionation has been going on using early and late cut alfalfa and grass. Techniques have been developed to look at some of the components within each grouping.

Table 8: Effect of Buffer and Distilled Water on Per Cent Solubility of Alfalfa and Bromegrass

	H20° %	Buffer+ %
Alfalfa G611 (early)	43.0	42.6
G614 (late)	34.4	33.9
Bromegrass G619 (early)	32.7	30.8
G6112 (late)	31.3	29.3

° Distilled water pH 5.9
+ Buffer - Mon + di basic sodium phosphate pH 5.7.

Alfalfa cut either at an early or late stage contains a higher proportion of water soluble material than grasses. The buffer (Mono basic sodium phosphate) at a pH of 5.7 results in comparable results to those of distilled water.

Two sources of cellulase enzymes are available: an industrial and a purified type. Neither of these are refined to a degree that they will remove only cellulose.

Table 9: Effect of Industrial vs. Purified Cellulase

	Buffer		Industrial°		Purified+	
Time (hrs.)	24	48	24	48	24	48
Alfalfa (G611)	36.4	36.0	38.2	40.5	47.9	52.2

° conc. industrial 500 units or 125 mgms/tube.
+ conc. purified 100 mgms/tube.

These two cellulase enzymes were evaluated and the data showed that the so-called purified cellulase resulted in higher solubility of the components. Studies on the quantity of enzymes were also made. The amounts shown in Table 9 appeared to be the maximum values obtainable.

Determination of six carbon sugars were made on the extracts after treatments with buffer and buffer plus cellulase have been completed using the anthrone technique.

Table 10: Effect of Time on Disappearance of Soluble Sugars

		6 Hours		48 Hours	
		% Sugar	% D.D.M.	% Sugar	% D.D.M.
G611	Buffer	9.8	38.0	3.4	37.2
	Buffer + Cell.	12.2	49.8	4.8	54.3
G619	Buffer	10.8	27.9	10.1	27.8
	Buffer + Cell.	15.6	41.3	13.9	51.0

It was found that the per cent sugar decreased with increasing times of digestion with early cut alfalfa, but not so with early cut bromegrass. In addition, the cellulase was instrumental in releasing additional sugars. Thus the need was for a substance to stop the further breakdown of these sugars if the quantities were to be measured and identifications made. Toluene, an anticeptic was used.

Table 11: Effect of Toluene on the Soluble Carbohydrates

	Periods of Digestion (Hrs.) 6	12	24	36	48	96
Buffer + Toluene	9.6+	9.3	10.0	9.6	9.6	8.9
Buffer + 0 Toluene	9.8	2.6	1.9	1.6	1.1	1.1
Cellulase + Toluene	12.6	15.0	15.7	16.1	18.8	17.1
" + 0 Toluene	12.0	2.8	2.9	2.6	2.7	2.8

+ % of dry weight (6 carbon sugars.)

It was found by using Toluene that these sugars could be prevented from breaking down and thus be measured by the anthrone technique. Use of Toluene with buffer or buffer plus cellulase media does not influence total digestion of the samples. However, where Toluene is used on Rumen Liquor the digestibility is somewhat different. (Table 12)

Table 12: Effect of Toluene and Actidione on the Digestibility of Forages

	Rumen Liquor Co2	Toluene	Actidione	Buffer Co2	Toluene	Actidione
Alfalfa (G611)	50.6	53.0	48.3	41.5	43.9	41.0
Bromegrass (G619)	57.3	40.0	53.5	35.0	33.8	35.1

In addition to Toluene, actidione (an antibiotic) was used to fulfill the same purpose. However, no sugar analyses have been completed as yet, when actidione was used.

Rumen Liquor digestion values and those of the solubility of components using buffer cellulase and pepsin were obtained in a number of trials involving early and late cut alfalfa and bromegrass.

Table 13: Digestibilities With Various Reagents

Forage Samples	R.L. + Pepsin	Buffer	Cellulase	Buffer Cellulase + Pepsin
Alfalfa G611	72.7	43.2	54.5	70.5
G614	58.4	26.1	37.6	47.4
Brome G619	81.5	33.9	51.0	64.1
G6112	59.5	25.8	28.9	37.9

Data from one of those trials are shown in Table 13. The technique of using buffer plus cellulase plus pepsin approximated the digestibility of rumen liquor only in early cut alfalfa. In late cut alfalfa and early and late cut bromegrass the values were considerably lower than the rumen liquor digestion.

This suggested that the residue remaining after the removal of water soluable, digestible cellulose and protein material contained chemical components which are present to a greater extent in early cut brome than in alfalfa and that the proportion of the components increase with age of the plant.

In order to determine the components of the residue five and ten per cent KOH and 5% K_2CO_3 solutions were used to remove the non polyuronic hemicelluloses and polyuronic hemicelluloses respectively.

Table 14: Influence of Potassium Salts on Removal of Hemicelluloses

	Cellulase Alone	Cellulase + 5% KOH	48 Hours Followed By: Cellulase + 10% KOH	Cellulase + 5% K_2Co_3
Alfalfa G611 (early)	56.3	74.3	74.0	63.6
G614 (late)	38.1	59.7	58.2	46.9
Brome G619 (early)	52.6	79.2	79.7	60.9
G6112 (late)	34.5	61.0	62.0	41.6

It would appear that the major component in the residue as indicated by the material removed by the KOH is of the non polyuronic type (glactans, pentasans, etc.) The proportion of polyuronic cellulases appears to be somewhat smaller. The use of 10% KOH solutions did not remove any more material than the 5%. It is also interesting to note that the use of cellulase followed by 8 hours of 5% KOH resulted in soluability values that are very similar to the total digestion as obtained from rumen liquor. (Refer to the previous table.)

Using the standard samples this technique was compared to the Rumen Liquor technique. Data are as yet not completely processed; however, indications are that this may be a technique that could be used to replace the rumen liquor. Additional work is required to perfect the method.

Table 15: Comparison of Rumen Liquor and Cellulase Techniques

	Rumen liquor				Cellulase + 5% KOH			
Sample	85	87	89	Ave.	85	87	89	Ave.
Mac. Alfalfa	57.9	60.7	60.6	59.8	56.4	60.0	61.8	59.4
Mac Brome	58.4	60.9	59.6	59.6	58.4	58.6	59.2	58.7
Purdue Alfalfa	55.2	58.2	56.9	56.8	62.4	60.1	57.6	60.1
O.A.C. alfalfa	75.5	77.4	76.5	76.5	71.3	71.0	70.0	70.8

ANNUAL GRASS TRIALS - 1962

I. Effect of Seeding Rates on Westerwolth Ryegrass - 1962 (Test 228)

Most of the European data pertaining to the use of Westerwolth ryegrass has indicated the use of high seeding rates from 25 to 45 pounds per acre. In previous work at Guelph with Westerwolth ryegrass 15 pounds per acre has been the seeding rate used. The test was conducted to determine if any advantage might be achieved from the use of higher seeding rates.

This test was seeded by hand in a broadcast planting on range D-16 on April 30, 1962. Plot size was 5 ft. x 16½ ft. and the design used was a split-plot with the main plots including a hay management and a pasture management. Under the hay management the material was clipped after the grass showed considerable heading over the plot. The pasture plots were harvested when 10 to 12 inches of growth was present or prior to heading of the grass. Seeding rates of 10, 15, 20, 25 and 30 pounds per acre made up the sub-plots. The tetraploid C.B. Westerwolth variety was used in the test.

Prior to seeding 75 pounds of nitrogen was applied to the test site and during the life of the trial 50 pounds of nitrogen was applied to the whole test after the hay cuts were made. Although moisture was definitely limited on the trial it was not possible to irrigate the test. Therefore, the results should be a good indication of the potential of Westerwolth ryegrass in a dry season when no supplementary water is applied.

The yields achieved in 1962 from Westerwolth ryegrass are close to the minimum acceptable level for an annual grass crop. In comparison to alfalfa or an alfalfa-grass mixture the yield is relatively low. The hay management outyielded the pasture management by almost one ton of dry matter. No differential response to seeding rates occurred under the two management systems.

Yields were the same for all seeding rates used in the experiment except in the first cut and season total. The lowest seed rate (10 pounds per acre) was lower yielding than the other rates used. There was no advantage seeding more than 15 pounds per acre. The ten pound seeding rate was satisfactory for later cuts under the hay management.

Stand counts made May 29 definitely show a lower number of plants per square foot for the 10 and 15 pound rate. An explanation of the greater yield obtained from the 15 pound rate over the 10 pound rate even though stand counts indicate the same number of plants per square foot cannot be offered.

EFFECT OF SEEDING RATES ON YIELD OF WESTERWOLTH RYEGRASS (TETRAPLOID C.B.) - 1962 (TEST 228)

Yield in lbs./acre of dry matter

Seeding Rates	Cut 1	Cut 2	Cut 3	Cut 4	Cut 5	Cut 6	Seasonal Total
			PASTURE MANAGEMENT				
	Jun.20	Jul.12	Aug.8	Sept.5	Oct.2	Nov.5	
10 lbs/acre	692	854	1360	452	314	577	4250
15	726	920	1483	560	406	571	4666
20	632	866	1389	555	467	588	4498
25	962	950	1382	529	431	584	4837
30	996	898	1391	507	462	524	4828
Mean	802	898	1401	521	415	579	4616
			HAY MANAGEMENT				
	Jul.12	Aug.22	Nov.5				
10 lbs/acre	2067	2459	1551				6076
15	2084	2491	1639				6215
20	2200	2518	1612				6330
25	2113	2549	1627				6290
30	2276	2480	1620				6377
Mean	2148	2500	1610				6256
Pasture + Hay Mean	1475	1699	1506				5437
Management .05	443	166	N.S.	----	----	----	867
.01	813	304	N.S.	----	----	----	1591
Rates .05	141	N.S.	N.S.	N.S.	N.S.	N.S.	242
.01	191	N.S.	N.S.	N.S.	N.S.	N.S.	328
Rates x Man. .05	N.S.	N.S.	N.S.	----	----	----	N.S.
.01	N.S.	N.S.	N.S.	----	----	----	N.S.
C.V. (%)	9.2	9.7	4.5	14.3	19.5	8.9	4.3

EFFECT OF SEEDING RATES ON STAND OF WESTERWOLTH RYEGRASS - 1962 (TEST 228)

Rates	Stand count - plants/sq.ft. - May 29
10	9.2
15	9.2
20	12.2
25	16.2
30	21.3
L.S.D. @ .05	2.1
@ .01	2.9
C.V. (%)	15.0

II. Effect of Management and Cutting Height on Yield of Westerwolth and Italian Ryegrass - 1962 (Test 229)

This test was conducted to determine the effect, if any, of cutting height under the two management systems, pasture and hay, on Westerwolth and Italian ryegrass. Information obtained from the test would be useful in specifying suitable managements for maximum recovery growth.

The methods and fertilization used in test 228 were repeated in test 229. The cutting heights used were 1", 2" and 4" above ground level. Tetraploid CB Westerwolth and common Italian ryegrass (probably Washington common) were the varieties used in the test. With the hay management each cut was made when most of the material was headed out. With the pasture management each cut was made prior to heading. At the last cut, November 6, all plots were cut at the one inch height.

The only important interaction observed in the test was between species and management in the first cut and total season yield. In the first cut, the Westerwolth variety yielded less relative to the Italian variety with the hay management than with the pasture management. In the season yield, Westerwolth yielded more than Italian under pasture management while the relative yields of the varieties were reversed under the hay management. This indicates that Westerwolth is slightly superior to Italian ryegrass as a pasture species.

In regard to cutting height the one inch height was superior to the other heights in cut 1 while in the final cut the four-inch height was superior. Both of these conditions would be expected on the basis of the methods used. In the other cuts the one inch cutting height appeared slightly higher-yielding than the other cutting heights. Over the season the one inch cutting height yielded the most. There was some indication that the one inch height was causing some harm to the stand or recovery growth after the fourth cut under pasture management.

The yields of these varieties were again approximately one ton greater under hay management than under pasture management.

The plant height data indicate that growth was slightly faster at the one inch cutting height than at the other heights under the pasture management. Under the hay management growth seemed to progress at about the same rate for all cutting heights.

Additional observations were made on rate of recovery growth, location and type of recovery growth but they have not been summarized at this time.

EFFECT OF MANAGEMENT AND CUTTING HEIGHTS ON YIELDS OF WESTERWOLTH AND ITALIAN RYEGRASS - 1962 (TEST 229)

Dry matter yields in pounds per acre

Height of Cut	Variety		Cut 1	Cut 2	Cut 3	Cut 4	Cut 5	Cut 6	Seasonal Total
					PASTURE MANAGEMENT				
			Jun.20	Jul.12	Aug.8	Sept.5	Oct.2	Nov.6	
1"	Westerwolth		1177	1425	1649	652	455	326	5684
	Italian		1379	1263	1387	548	482	201	5260
2"	Westerwolth		883	1064	1497	558	470	567	5039
	Italian		887	1090	1187	598	462	663	4888
4"	Westerwolth		555	1048	1389	598	635	993	5218
	Italian		557	1017	1121	494	710	1066	4963
	Means 1"		1278	1344	1518	600	468	263	5472
	2"		885	1077	1342	578	466	615	4964
	4"		555	1032	1255	545	672	1029	5091
	Westerwolth		872	1179	1512	603	520	629	5314
	Italian		941	1123	1232	547	551	643	5037
	Pasture Mean		906	1151	1372	575	536	636	5176
					HAY MANAGEMENT				
			Jul.12	Aug.22	Nov.6				
1"	Westerwolth		2817	3006	1476				7299
	Italian		3346	2816	1185				7347
2"	Westerwolth		2535	2646	1546				6727
	Italian		2992	2478	1368				6838
4"	Westerwolth		1858	2378	1870				6106
	Italian		2554	2392	1924				6869
	Means 1"		3081	2911	1330				7323
	2"		2766	2562	1455				6783
	4"		2206	2385	1897				6488
	Westerwolth		2403	2676	1631				6710
	Italian		2964	2562	1492				7018
	Hay Mean		2684	2619	1561				6864
Pasture + Hay Mean			1795	1885	1467				6020
L.S.D.									
Cutting Heights		.05	288	239	N.S.	N.S.	68	73	389
		.01	436	N.S.	N.S.	N.S.	103	111	N.S.
Managements		.05	165	177	65	----	----	----	333
		.01	270	255	93	----	----	----	479
Heights x Managements		.05	N.S.	N.S.	112	----	----	----	N.S.
		.01	N.S.	N.S.	162	----	----	----	N.S.
Varieties		.05	94	178	76	57	N.S.	N.S.	N.S.
		.01	128	N.S.	104	N.S.	N.S.	N.S.	N.S.
Varieties x Heights		.05	N.S.	N.S.	N.S.	N.S.	N.S.	132.95	N.S.
		.01	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Varieties x Management		.05	132	N.S.	N.S.	----	----	----	200
		.01	181	N.S.	N.S.	----	----	----	274
Var. x Heights x Manag.		.05	N.S.	N.S.	N.S.	----	----	----	N.S.
		.01	N.S.	N.S.	N.S.	----	----	----	N.S.
C.V. (%)			8.6	15.6	8.5	10.6	12.7	13.1	3.9

EFFECT OF MANAGEMENT AND CUTTING HIEHGTS ON PLANT HEIGHT OF WESTERWOLTH AND ITALIAN RYEGRASS - 1962 (TEST 229)

Plant Height (in inches)

Cutting Heights	July 12	July 20	July 26	Aug. 8	Aug.15	Aug.22	Aug.29	Sept.4	Oct. 2
				PASTURE MANAGEMENT					
1" Westerwolth	17.0	5.1	7.4	20.5	6.2	8.4	11.3	13.7	9.5
Italian	15.0	3.3	4.6	15.5	5.1	6.7	6.7	10.1	8.0
2" Westerwolth	20.5	7.1	8.6	22.4	7.2	10.0	13.2	14.6	11.6
Italian	17.7	4.6	5.6	16.1	6.0	7.7	9.4	11.3	9.4
4" Westerwolth	21.0	8.1	10.2	23.6	9.4	13.4	15.8	18.5	14.3
Italian	17.5	6.1	6.7	17.1	8.2	10.3	12.5	15.1	12.2
Means 1"	16.0	4.2	6.0	18.0	5.7	7.5	9.0	11.9	8.8
2"	19.1	5.9	7.1	19.2	6.6	8.8	11.3	12.9	10.5
Westerwolth	19.5	6.8	8.7	22.1	7.6	10.6	13.5	15.6	11.8
Italian	16.7	4.7	5.6	16.2	6.4	8.2	9.6	12.2	9.9
Pasture Mean	18.1	5.7	7.2	19.2	7.0	9.4	11.5	13.9	10.9
				HAY MANAGEMENT					
1" Westerwolth	29.2	5.8	8.2	19.7	27.0	30.1	5.1	6.7	12.1
Italian	29.7	4.1	5.9	14.9	20.3	24.5	4.6	5.7	8.7
2" Westerwolth	29.0	7.5	9.1	22.2	26.7	30.9	6.4	7.2	13.0
Italian	31.5	6.3	6.4	15.8	20.1	26.0	5.6	6.5	10.9
4" Westerwolth	29.5	8.5	11.1	22.5	27.8	31.9	8.0	8.7	15.0
Italian	29.2	6.7	7.7	18.7	22.2	28.0	7.4	8.2	13.1
Means 1"	29.5	5.0	7.1	17.3	23.7	27.3	4.8	6.2	10.4
2"	30.2	6.9	7.8	19.0	23.4	28.5	6.0	6.9	12.0
4"	29.4	7.6	9.4	20.6	25.0	30.0	6.9	8.5	14.1
Westerwolth	29.2	7.3	14.2	21.5	24.0	31.0	6.5	7.6	13.4
Italian	30.2	5.8	10.0	16.5	27.2	26.2	5.9	6.8	10.9
Hay Mean	29.7	6.5	8.1	20.6	20.9	28.6	6.2	7.2	12.2
Mean Pasture + Hay	24.0	6.1	7.6	19.1	15.5	19.0	8.8	10.5	11.5

III. Yield of Seed of Three Annual Grasses - 1962 (Test 230)

This small test which included Westerwolth (Tetraploid C.B.) and Italian (common) ryegrass and rescuegrass (Georgia Selection) was used to determine the potential seed yield of the three grasses.

The test was seeded by hand in broadcast plantings on range D-16 on April 30, 1962. Four replicates were seeded of a randomized complete block design. Plot size was 5' x 16½' of which 3' x 12' was harvested for seed yield. No supplemental water was applied and the test suffered some from drought.

The rescuegrass stand was very poor and was considered to be only about ¼ of a good stand. The stand of Westerwolth was about half that of Italian ryegrass; however, it appeared to be a satisfactory stand. The seed yield data presented can only be considered as a rough index of potential importance. The surprising feature is the high yield of rescuegrass seed which was obtained from such a poor stand. In the case of the ryegrass varieties, the yields would have to be two to three times as large before seed production would be profitable.

YIELD OF SEED OF THREE ANNUAL GRASSES - 1962 (TEST 230)

	Yield (lbs./acre)	Stand (May 30)
Westerwolth	144	10.5
Italian ryegrass	364	22.5
Rescuegrass	469	5.5
L.S.D. @ .05	107	
@ .01	162	
C.V. (%)	19	

IV. Growth Curve Study on Italian Ryegrass - 1962 (Test 231)

This test was set up to determine the yield response curve of Italian and Westerwolth ryegrass. However, the Westerwolth ryegrass did not establish well due to poor seeding. It is essential when seeding Westerwolth ryegrass to use a seeddrill with an agitator because of the small awns on the Westerwolth. Some information was obtained from the Westerwolth ryegrass but is not as good as that for the Italian ryegrass. The results for the two types of ryegrass are reported separately. Results for the Italian ryegrass are a mean of six replicates while only three replicates are meaned for the Westerwolth ryegrass.

A split plot design was used for the Italian ryegrass wherein the aftermath was harvested as pasture in one case while in the other was harvested as hay. In the case of Westerwolth ryegrass the aftermath was harvested at a pasture stage of growth. The pasture management consisted of harvesting just prior to heading while the hay management was harvested after most of the plants were headed.

The test was planted April 30, and the first harvest was made June 13, or six weeks after seeding. The remaining seven initial harvests were made at weekly intervals. The aftermath harvests were made according to their stage of growth and, in most cases, this meant weekly harvests. A final harvest was made on all plots on November 5.

Growth was affected by poor moisture conditions. This is indicated by the percent dry matter data presented for the initial harvest. No supplemental irrigation was applied to the test. Prior to planting 75 pounds of nitrogen per acre was applied to the test area (D-16) and an additional 50 pounds of nitrogen per acre was applied on all plots prior to and including the fourth initial cut. Thereafter each plot cut initially was supplied with nitrogen at the above rate.

Both species were headed at the time of the fourth cut and this would appear to be the best time to cut for quality material. However, maximum yield was not obtained until the sixth cut. The Westerwolth appeared of better quality at this later cut than the Italian ryegrass. This material will be analyzed for percent digestibility in the *in vitro* laboratory.

Additional information was obtained on location and type of recovery growth, rate of recovery growth, development of the two species, etc. These data have not been summarized at this time and are not available for inclusion in the report.

GROWTH CURVE STUDY ON ITALIAN RYEGRASS - 1962 (TEST 231)

Yield in pounds of dry matter per acre

Growth Stage	Date	Yield	Aftermath Harvest Dates and Yields											Aftermath Total Yield	Season Total Yield
			7-11	7-18	7-25	8-1	8-8	8-15	8-22	8-29	9-5	9-18	10-3	11-5	
AFTERMATH PASTURE MANAGEMENT															
1	6-13	649	1640				1188				635			654	4117	4767
2	6-20	1255		1113			900				708			638	3359	4614
3	6-27	2050			638			976					687	91	2392	44441
4	7-4	2707				963			601				422	157	2143	4844
5*	7-11	3281					1174					939		557	2670	5394
6	7-18	3925						1523						714	2237	6163
7	7-25	3877							1533					566	2099	5975
8	8-1	4163							1031					628	1659	5822
Mean		2738														
AFTERMATH HAY MANAGEMENT																
1	6-13	665		2094					2124					1544	5762	6421
2	6-20	1240			1381					1578				1538	4497	5736
3	6-27	2079				1288					1037		643	1085	3410	5488
4	7-4	3059					1237						643	77	1957	5016
5	7-11	3378						1711						759	2470	5848
6	7-18	3809							2129					668	2797	6606
7	7-25	3450								1658				736	2394	5843
8	8-1	4201									1696			523	2219	6421
Mean		2735														

* Anthesis occurred

		Cut 1	Cut 2	Cut 3	Cut 4 Past.	Cut 4 Hay	Cut 5	Total
L.S.D. Management	.05	N.S.	69.7	68.4	----	----	----	333.9
	.01	N.S.	109.3	107.2	----	----	----	523.6
Growth Stages	.05	348.7	204.4	182.7	188.5	181.1	121.1	520.6
	.01	463.1	271.5	242.6	N.S.	247.0	167.5	691.4
Growth Stages x Management	.05	N.S.	N.S.	258.4	----	----	----	736.3
	.01	N.S.	N.S.	343.1	----	----	----	N.S.
C.V. (%)		15.6	17.6	24.6	26.1	14.2	25.6	11.4

GROWTH CURVE STUDY ON ITALIAN RYEGRASS - 1962 (TEST 231)

Heights of grass in inches

Growth Stages	Jun.15	Jun.25	Jun.29	Jul.4	Jul.11	Jul.18	Jul.25	Aug.1	Aug.8	Aug.15	Aug.22	Aug.29	Sept.4	Sep.19
PASTURE														
1	9.8	12.5*	13.2	17.2	22.1	7.1	8.0	12.3	16.9	7.1	8.3	8.8	11.1	7.3
2	10.6	8.4*	9.1	11.2	14.1	18.1	6.2	9.3	13.9	6.7	8.4	9.9	12.4	7.1
3	10.9	19.3	4.1	7.7	8.3	10.1	13.4	7.2	11.0	14.4	6.5	7.6	8.5	12.9
4	10.7	18.9	22.6	28.6	5.5	7.4	8.3	12.1	7.2	9.7	12.6	5.2	5.9	11.6
5	10.2	19.0	22.9	28.4	30.7	8.2	8.3	11.6	16.8	7.1	8.1	9.7	12.0	16.4
6	10.6	19.6	23.6	29.4	31.1	31.1	7.5	10.1	13.6	17.6	6.7	7.3	7.4	10.9
7	10.1	19.0	23.2	29.2	31.7	32.1	32.2	8.2	11.0	13.7	18.2	5.8	6.6	9.3
8	10.3	18.8	23.0	29.2	30.3	30.2	30.3	31.0	8.7	11.7	14.2	6.0	6.8	9.0
Mean	10.4	16.9	17.7	22.6	21.7	18.0	14.3	12.7	12.4	11.0	10.4	7.5	8.9	10.5
HAY														
1	9.6	12.3*	13.9	17.0	22.3	24.9	7.1	9.6	13.3	18.3	23.3	5.6	6.1	8.9
2	11.0	8.5*	9.5	11.9	14.1	20.8	23.5	7.5	10.8	13.4	17.5	22.4	5.1	8.5
3	10.7	19.4	4.5	7.8	8.3	9.2	12.9	17.9	8.6	9.7	12.2	17.6	18.8	8.9
4	10.9	19.1	24.6	29.2	5.7	7.9	8.7	13.2	19.6	6.6	8.2	8.7	11.5	14.5
5	11.1	18.6	23.4	29.1	30.3	7.7	11.8	11.5	16.6	21.7	6.9	6.9	7.6	10.1
6	10.9	19.4	24.1	28.8	30.5	30.3	6.9	9.7	13.9	18.3	21.7	5.4	6.3	8.5
7	10.3	19.4	23.0	28.2	29.7	30.2	30.8	8.4	10.6	13.6	17.7	21.0	5.4	10.3
8	10.9	19.6	22.9	28.8	31.2	26.9	31.7	31.2	9.4	12.5	15.8	19.2	22.0	9.0
Mean	10.7	17.0	18.2	22.6	21.5	19.7	16.7	13.6	12.8	14.3	15.4	13.4	10.3	9.8
Hay + Pasture Mean	10.5	17.0	18.0	22.6	21.6	18.9	15.5	13.2	12.6	12.6	12.9	10.4	9.6	10.2

* Measured June 27

GROWTH CURVE STUDY ON WESTERWOLTH RYEGRASS - 1962 (TEST 231)

Yields in pounds of dry matter per acre

Growth Stage	Date	Yield	7-11	7-18	7-25	8-1	8-8	8-15	8-22	8-29	9-5	9-18	10-3	11-5	After-math Total Yield	Season Total Yield
1	6-13	1265	1855				1616			521				1315	5307	6572
2	6-20	1169		1386			1082				517			746	3731	4900
3	6-27	1950			1075			1234				763		368	3440	5390
4	7-4	2831				1406			1041				532	405	3384	6215
5*	7-11	3253					1437			388				1239	3064	6317
6	7-18	4042					1310				652			891	2853	6895
7	7-25	3442						1791				844		599	3234	6676
8	8-1	3765							1505				373	423	2301	6056

			Cut 1	Cut 2	Cut 3	Cut 4	Cut 5	Total
L.S.D.	Growth Stages	.05	834.5	345.3	191.6	339.1	378.2	1197.4
		.01	1158.1	479.3	266.0	470.7	573.0	N.S.
C.V. (%)			17.5	13.2	12.1	28.3	26.7	11.1

* Anthesis occurred

GROWTH CURVE STUDY ON WESTERWOLTH RYEGRASS - 1962 (TEST 231)

Height of grass in inches

Growth Stages	Jun.25	Jun.29	Jul. 4	Jul.11	Jul.18	Jul.25	Aug. 1	Aug. 8	Aug.15	Aug.22	Aug.29	Sept.4	Sep.19
1	16.1	15.0	19.7	26.0	9.2	12.1	19.1	25.3	7.8	10.7	14.1	6.1	10.7
2	11.1	11.7	14.3	18.3	25.0	7.8	13.9	22.1	6.8	10.2	13.7	16.1	7.1
3		4.0	10.0	11.7	17.8	23.7	10.0	13.9	19.3	6.8	9.4	10.6	17.5
4				7.7	12.4	16.0	23.8	10.9	13.1	17.6	6.6	9.3	12.0
5					8.2	11.4	17.6	25.7	8.3	11.5	13.7	6.3	11.5
6						8.5	14.1	24.2	7.5	10.2	13.0	16.7	8.9
7							9.8	14.8	21.0	7.2	9.9	11.0	20.0
8								9.8	14.9	20.3	6.0	7.9	11.5
Mean	13.6	10.2	14.7	15.9	14.5	13.3	15.5	18.3	12.3	11.8	10.8	10.5	12.4

GROWTH CURVE STUDY ON ANNUAL RYEGRASS - 1962 (TEST 231)

Percent Dry Matter at Harvest

Growth Stage	Italian Ryegrass	Westerwolth Ryegrass
1	15.4	14.1
2	12.6	12.3
3	13.7	12.0
4	19.5	14.5
5	30.2	25.8
6	36.5	29.5
7*	26.2	22.9
8*	26.0	21.4

* Lower moisture due partially to recovery growth and rainfall which occurred at that time.

ALTERNATE ROW SEEDING OF DUPUITS ALFAlfA AND WESTERWOLTH RYEGRASS

Treatment	% D.M. at Harvest			Yield of Mixture lbs. D.M./acre		
	Cut 1	Cut 2	Average	Cut 1	Cut 2	Total
0 Nitrogen	29.6	24.2	26.8	4007	2550	6557
25 N*	26.9	25.8	26.4	3245	2885	6130
50 N+	25.4	24.4	24.8	3.46	2997	6143
Harvesting date	July 10	Aug. 24		July 10	Aug. 24	

* 2 applications - total 50 lbs. N

\+ 2 applications - total 100 lbs. N

YIELD OF ALFALFA COMPONENT

Treatment	1st Cut	2nd Cut	Total
0	1670	1433	3103
25	1513	1389	2902
50	1355	1672	3027

Note: 3rd cut taken on October 12 - Observation cut only.
Yield average for each treatment slightly over 1300 lbs.

Planted: April 27

Fertility: High

Seeding Rate: Alfalfa - 8 lbs./acre; Westerwolth - 15 lbs./acre

OAT LODGING AND FORAGE ESTABLISHMENT
1961 - Test 153 1962 - Test 161

Objectives

To study the effect of time and degree of lodging of an oat companion crop upon the establishment and development of Vernal alfalfa and Lincoln bromegrass.

Design

Split-plot with 6 replications
Main plots - companion crop treatments
Sub plots - forage species
Seeded plot size - 8 ft. x 13 ft.
Lodged plot size - 5 ft. x 10 ft.

Procedure

1. Garry oats seeded at 2½ bushels per acre under high fertility
2. Underseeded with pure stands of Vernal - 10 lbs. and Lincoln - 12 lbs.
3. Oats lodged after allowing to grow through fence wire stretched over a frame (5'x10'), the latter held 10 inches off the soil.
4. Treatments, a combination of lodging at heading and at the dough stage to 60° and 90°.

Data collected on:

1. Oat density - number of stems per foot of row.
2. Length of straw and yield of straw.
3. Oat yield and quality.
4. Light intensity readings at seedling level when lodged and at oat harvest.
5. Stand counts before lodging, oat harvest, late fall.
6. Height, weight, no tillers, at lodging time, oat harvest, and late fall (10 seedling sample per plot).
7. First crop hay or plant yield at hay stage.

Observations

1. Test 153 in 1961 was seriously damaged by birds just as the oats were emerging and consequently, the data in the 1961 report is not too reliable. The test was carried through to screen the techniques suggested in the outline.

2. Test 161 in 1962, the oats did not germinate as well as expected and the crop was rather thin. The land, however, was very fertile, as the straw yields indicate and a heavy growthy oat crop was obtained. On July 12, between the first and second lodging date, a severe storm lodged all the oats. The oats were so twisted that those growing through the wire frames in the unlodged plots could not be put upright by raising the frame. In the severe lodging treatment only on July 27, the oats were put flatter.

3. No analysis of data completed in 1962.

TEST 161 - OAT LODGING (1962)

Seeded: April 30, 1962 Location E-16 Oats Harvested: Aug. 17, 1962

Lodging Treatment	Oat Yield and Quality: Oat Yield Lbs./A	Straw Yield Lbs./A	Oat Weight Lbs/Bus.	1000 Seed Wgt Gms.	Per cent Hull	Establishment: Plants/Square Foot: Spring: Vernal	Spring: Lincoln	Fall: Vernal	Fall: Lincoln	% Light Interception Aug 15
*										
Early, moderate	2260	5149	31.5	26.5	31.0	20.9	11.0	23.6	12.9	76
Early, severe	2036	5149	31.5	25.2	31.0	21.9	11.3	19.9	10.7	78
*										
Late, moderate	1880	5112	30.0	25.0	31.4	19.2	9.2	19.4	10.5	82
Late, severe	2036	5280	31.2	24.4	32.6	23.9	11.9	17.1	10.4	81
No lodging	1924	4919	30.7	22.8	32.0	18.0	10.1	15.3	13.7	72
No Companion						24.3	14.1	25.0	17.1	

* Early - 7/5/62: Late - 7/27/62 - Lodged

TEST 161 - OAT LODGING (1962)

Seeded: April 30, 1962 | 10 Plant Samples | Location: E-16

	Lodging Treatment					
	Early, Moderate	Early, Severe	Late, Moderate	Late Severe	No Lodging	No Companion
July 10, 1962						
Lincoln Brome						
Height					32.5	51.8
Stools					1.1	4.4
Dry Weight					1.2	19.6
Vernal Alfalfa						
Height					32.6	50.6
Stools					1.1	2.0
Dry Weight					2.0	14.8
July 27, 1962						
Lincoln Brome						
Height	37.4	35.0			38.0	57.0
Stools	1.2	1.1			1.1	4.5
Dry Weight	1.3	1.0			1.3	27.1
Vernal Alfalfa						
Height	30.7	37.9			41.4	52.0
Stools	1.7	1.4			1.7	1.9
Dry Weight	1.4	1.9			2.2	21.7
August 17, 1962						
Lincoln Brome						
Height	31.8	34.6	35.1	35.7	32.8	55.0
Stools	2.9	2.9	2.9	2.5	2.5	5.6
Dry Weight	1.8	1.9	2.2	1.5	1.5	26.6
Vernal Alfalfa						
Height	29.5	36.4	35.6	34.1	33.4	46.3
Stools	1.9	2.9	2.7	1.8	2.0	2.3
Dry Weight	2.0	1.9	2.2	1.7	1.8	14.2
October 18, 1962						
Lincoln Brome						
Height	18.8	20.2	20.6	20.5	18.6	18.4
Stools	10.3	9.9	10.6	10.0	12.2	9.3
Dry Weight	8.8	8.8	9.8	8.9	10.0	8.9
Vernal Alfalfa						
Height	17.1	18.0	17.6	17.8	17.3	20.1
Stools	3.2	3.3	3.3	3.2	3.6	3.2
Dry Weight	5.5	5.2	5.7	5.9	7.6	7.3

Seeded: May 4, 1962

TEST 163 - BARLEY VARIETY AND ESTABLISHMENT - 1962
Underseeded with Vernal and Lincoln

Location: E-16

10 Plant Samples

	VARIETY					
	York	Herta	Parkland	Mix. Grain	Garry	No Campanion
Main Stems Per Foot of Row	19.1	21.4	20.9	18.7	19.2	
*Establishment						
Spring						
Lincoln	15	11	11	11	14	27
Vernal	24	27	22	18	27	40
Fall						
Lincoln	4	2	1	3	4	9
Vernal	4	3	4	5	6	9
June 20, 1962						
Lincoln Brome						
Height	15.7	13.2	12.8	15.5	16.2	19.5
Stools	1.0	1.0	1.0	1.0	1.0	1.5
Vernal Alfalfa						
Height	7.1	7.7	6.9	8.1	9.0	16.2
Stools	1.0	1.0	1.0	1.0	1.0	1.1
July 17, 1962						
Lincoln Brome						
Height	23.7	20.7	22.3	21.8	21.2	54.3
Stools	1.0	1.0	1.0	1.0	1.0	3.7
Vernal Alfalfa						
Height	8.5	9.3	8.4	9.9	14.3	33.4
Stools	1.0	1.0	1.1	1.1	1.1	1.6
August 15, 1962						
Lincoln Brome						
Height	21.5	18.3	18.7	24.8	27.0	57.9
Stools	2.0	1.6	1.4	2.1	2.1	5.0
Vernal Alfalfa						
Height	11.1	9.7	11.3	10.8	13.6	33.9
Stools	1.4	1.5	1.7	1.4	1.7	2.3

* Spring -plants per square foot; Fall - rated 1-10; 1 - no plants; 5 - medium; 10 - excellent.

In previous studies, barley was found to severely reduce the establishment of bromegrass and also severely reduce the vigor of alfalfa. This small replicated test was seeded to observe any differences among three barley varieties and mixed grain.

1. The test established well but lodged severely in mid July.
2. Some data were collected to learn if differences still occurred.
3. The lodging factor makes the test data unreliable.

TEST 165 RATE AND METHOD OF SEEDING RAPE - 1962

In 1962, as in other years, row seedings of rape were decidely superior in yield to the broadcast method at all rates of seeding used.

The Yield advantage of row seedings well compensates for the one cultivation which has been necessary to keep the crop clean.

Broadcast plantings are usually weedy, particularly at the lighter seeding rates.

Seeded July 12

TEST - RATE AND METHOD OF SEEDING RAPE (1962)

Harvested November 5

Method and Rate	Per cent Dry Matter	Green Yield Tons/Acre	Dry Matter Yield Tons/Acre	Height in Cms.	Diameter of Stems in Cms.	25 Plant Dry Wgt. in Gms.	Per Cent Leaf
Rows							
½ #	13.9	38.2	5.30	78	1.6	521	43.0
1 #	12.8	42.3	5.19	77	1.5	502	45.5
1½ #	12.6	37.2	4.67	79	1.5	488	43.9
2 #	11.4	41.1	4.63	81	1.4	467	43.3
Ave.	12.7	39.7	4.95	79	1.5	495	43.9
Broadcast							
2#	11.4	25.0	2.68	81	1.6	584	43.3
4 #	11.5	25.2	2.92	82	1.4	452	43.7
6 #	11.2	26.1	2.89	78	1.2	351	44.1
Ave.	11.4	25.4	2.83	80	1.4	4.62	43.5

RATE OF SEEDING RAPE (AVERAGE OF 1959, 1961, and 1962 CROPS)

Method and Rate	Per Cent Dry Matter	Green Yield Tons/Acre	Dry Matter Yield Tons/Acre	Weight in Cms.	* Diameter of stems in Cms.	* 25 Plant Dry Wgt. in gms.	* Per Cent Leaf
Rows							
½ #	11.5	27.7	3.32	90	1.6	659	36.7
1 #	11.2	29.4	3.32	88	1.5	610	38.5
1½ #	11.2	26.9	3.07	91	1.5	549	36.5
2 #	10.9	28.5	3.13	91	1.4	472	35.6
Broadcast							
2 #	11.7	18.1	1.95	92	1.4	511	34.5
4 #	11.4	18.2	2.10	89	1.3	371	33.9
6 #	11.8	18.1	2.11	86	1.1	294	34.1

* 1961 and 1962 Data only.

Forage Crop Publications and Papers Presented from May, 1962 to April 30, 1963

Crop Science Department, O.A.C.

(Publications and papers presented prior to May 1962 are listed in the 1961 Progress Report.)

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Jones, G.E. Relative merits of growing cereal crops or forages for milk and/or beef production in the East Central Region. Can. Soc. Agron. Proc. 1962, pp. 43-46, 1962.

Jones, G.E. Use of herbicides in the establishment of forage seedlings. Forage Notes 8: No. 3, 16-19, Fall, 1962.

Ontario Forage Crops Committee. 1962 progress report on farm plantings of forage crops, Department of Crop Sci. mimeo, 15 pp. Oct. 1962. (Dept. of Crop Sci., with K.A.S., W.O.A.S., and Soils and Crops Branch of the O.D.A.)

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Tossell, W.E. What the forage seed consumption area of Canada looks for in seed. Can. Seed Growers' Assoc. Proc. pp. 19-24, June 1962.

Young, W.S. Field crop recommendations for 1963. Proc. Ont. Soils and Crop Improvement Assoc. 1963 convention, pp. 76-81, Jan. 1963.