

PROGRESS REPORT
FORAGE CROP
INVESTIGATIONS

1957

FORAGE CROP PRODUCTION



Field Husbandry Department
Ontario Agricultural College
Guelph

FORAGE PROGRESS REPORT 1957

The data from all O.A.C. trials are compiled in this report for use of members of the Field Husbandry Department and those associated with the testing programs.

This report is not complete but does contain the main data collected from current projects and those completed in 1957.

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(Year refers to year trial was seeded)

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Red Clover vs. Ladino 1954. Tons D.M. Per Acre

Mixture*	Hay - Pasture**		Pasture 1957				2 year Average**	3 Year Average
	1955	1956	May 17	June 14	July 24	Total		
A-R-T-B	4.38	3.55	.63	1.37	.55	2.55	3.96	3.49
A-R-L-T-B	3.97	3.91	.98	1.41	.77	3.16	3.94	3.68
A-L-T-B	4.09	3.60	.92	1.68	.83	3.43	3.85	3.71
A-R-O-B	4.02	3.26	.78	1.27	.61	2.66	3.64	3.31
A-R-L-O-B	3.81	3.39	1.02	1.46	.77	3.25	3.61	3.48
A-L-O-B	3.76	3.51	1.08	1.34	.75	3.17	3.62	3.48
A-R-T-O	3.75	3.33	.80	1.43	.60	2.83	3.54	3.30
A-R-L-T-O	4.12	3.65	1.01	1.40	.70	3.11	3.89	3.63
A-L-T-O	3.82	3.66	1.03	1.43	.79	3.25	3.74	3.58
A-R-T-O-B	3.90	3.44	.75	1.21	.59	2.55	3.67	3.30
A-R-L-T-O-B	3.94	3.61	1.05	1.35	.69	3.09	3.78	3.55
A-L-T-O-B	4.04	3.47	1.05	1.45	.74	3.24	3.76	3.58
R-T-O	4.01	2.32	.62	1.32	.36	2.30	3.16	2.88
R-T	3.91	2.52	.57	1.40	.20	2.17	3.22	2.87
A-R-T	3.91	3.82	.76	1.33	.36	2.45	3.87	3.39
L.S.D. .05	N.S.	.27	.13	N.S.	.12	.52	.41	.50
.01	N.S.	.36	.17	N.S.	.16	.70	.55	.68
C.V.	9.1	5.2	10.1	21.2	13.1	12.6		8.8

* A = alfalfa; R = red clover; L = ladino; T = timothy; O = orchard; B = Brome

** Cut at hay stage in June; aftermath at pasture stage (2 cuts)

Red Clover vs. Ladino 1954. Percentage of Each Component in Dry Matter. May 17, 1957.

Mixture	Alf.	Red Cl.	Lad.	Tim.	Orch.	Br.
A-R-T-B	40.4	4.3	2.8	39.0	0.5	17.9
A-R-L-T-B	10.3	1.4	18.9	50.8	-	18.5
A-L-T-B	7.5	-	22.3	49.5	-	20.7
A-R-O-B	26.9	5.9	2.7	2.1	60.5	1.8
A-R-L-O-B	7.6	0.7	16.1	2.0	71.0	2.4
A-L-O-B	9.7	-	14.8	2.8	69.5	2.9
A-R-T-O	29.1	5.6	0.4	3.7	61.1	-
A-R-L-T-O	7.2	1.3	11.6	5.5	74.4	-
A-L-T-O	5.1	-	15.2	8.4	71.2	-
A-R-T-O-B	23.9	5.4	1.1	4.7	63.4	1.3
A-R-L-T-O-B	8.0	1.4	11.7	6.1	69.2	3.4
A-L-T-O-B	4.0	-	12.4	8.3	72.7	2.4
R-T-O	-	15.8	1.0	6.6	76.6	-
R-T	-	15.3	0.2	84.4	-	-
A-R-T	30.6	5.8	-	60.6	2.9	-

Red Clover vs. Ladino - 1954. Percentage of Each Component in Dry Matter - July 24, 1957.

*Check
recalculated*

Mixture	Alf.	Red Cl.	Lad.	Tim.	Orch.	Br.	
A-R-T-B	28.8	16.4	5.7	14.1	4.0*	25.1	- ?
A-R-L-T-B	7.5	5.0	18.4	25.1	10.2*	27.6	
A-L-T-B	2.0	-	24.1	29.3	3.7*	40.9	
A-R-O-B	19.7	16.7	2.7	1.1	51.2	4.3	
A-R-L-O-B	4.4	0.6	18.2	1.6	71.1	2.9	
A-L-O-B	5.7	-	19.0	1.1	68.4	4.5	
A-R-T-O	20.1	15.3	3.1	1.1	56.0	-	
A-R-L-T-O	3.8	7.1	12.8	4.9	70.0	-	
A-L-T-O	2.2	-	17.4	4.0	75.6	-	
A-R-T-O-B	17.4	12.8	2.2	1.5	55.8	4.7	
A-R-L-T-O-B	3.4	1.6	17.2	2.9	68.3	6.0	
A-L-T-O-B	3.8	0.4	18.5	1.9	68.2	5.1	
R-T-O	0.7	15.4	1.7	1.7	75.9	-	
R-T	-	32.0	10.9	37.0	12.1	-	
A-R-T	31.8	15.5	2.1	33.0	9.7	-	

* volunteer

HAY & SILAGE MIXTURE TRIAL 1956

	Silage or Early Hay	Medium Hay	Late Hay
DuPuits (10) + Climax (6)	X	X*	
" + Frode (8)	X	X*	
" + Lyon (10)	X	X*	X*
DuPuits (7) + Lad. (3) + Clim. (6)	X	X*	
" + " + Frode (8)	X	X*	
" + " + Lyon (10)	X	X*	
DuPuits (7) + LaSalle (3) + Clim. (6)	X	X*	
" + " + Frode (8)	X	X*	
" + " + Lyon (10)	X	X*	
DuPuits (7) + LaSalle (3) + Clim. (3)			
+ Frode (3)	X	X*	
DuPuits (7) + LaSalle (3) + Frode (3)			
+ Lyon (7)	X	X*	
DuPuits (7) + LaSalle (3) + Climax (3)			
+ Lyon (7)	X		
Empire (8) + Essex (6)			X
Empire (8) + Can. Brome (10)			X
Vernal (10) + Can. Brome (10)			X
Vernal (10) + S-48 (6)			X
Vernal (10) + S-48 (5) + Lyon (7)			X
Vernal (7) + LaSalle (3) + Clim. (3) + Lyon (7)	X	X	X
Can. Grimm (7) + Can. Red (3) + Com. Tim. (2)			
+ Dan. Orch (3) + Can. Br. (5)	X	X	X
Can. Grimm (7) + Can. Red (3) + Com. Tim. (6)	X	X	X
Can. Red (6) + Com. Tim. (6)	X	X	X

* DuPuits replaced by Vernal

HAY & SILAGE MIXTURE TRIAL 1956. EARLY GROUP TONS D.M./AC 1957.

	Hay June 18	Aftermath			Season Total
		July 23	Oct. 1	Total	
DuPuits + Climax	2.62	1.14	1.10	2.24	4.86
DuPuits + Frode	2.24	1.13	1.07	2.20	4.44
DuPuits + Lyon	2.76	1.20	0.97	2.17	4.93
DuPuits + Lad. + Clim.	2.67	1.13	1.01	2.14	4.81
DuPuits + Lad. + Frode	2.27	1.21	1.05	2.26	4.53
DuPuits + Lad. + Lyon	2.32	1.12	1.06	2.18	4.50
DuPuits + Las. + Clim.	2.61	1.19	1.10	2.29	4.90
DuPuits + Las. + Frode	2.35	1.14	1.06	2.20	4.55
DuPuits + Las. + Lyon	2.57	1.13	1.01	2.14	4.71
DuPuits + Las. + Cl. + Frode	2.52	1.11	1.04	2.15	4.67
DuPuits + Las. + Fr. + Lyon	2.57	1.14	1.03	2.17	4.74
DuPuits + Las. + Clim. + Lyon	2.51	1.05	1.12	2.17	4.68
Ver. + Las. + Clim. + Lyon	2.66	0.88	0.81	1.69	4.35
Alf. + Red. + Tim. + Or. + Br.	2.31	1.14	0.83	1.97	4.28
Alf. + Red + Tim.	2.70	1.13	0.84	1.97	4.67
Red + Tim.	2.24	0.89	0.52	1.41	3.65
L.S.D. 0.05	.31	.18	.13		.40
C.V.	7.7	9.6	8.1		5.2

5200
3892
9092
4546

4400
3419

3421
5400
8821

HAY & SILAGE MIXTURE TRIAL 1956. MEDIUM GROUP TONS D.M./ACRE 1957

	Hay	Aftermath			Season Total
	June 25	Aug.12	Oct.11	Total	
Ver. + Clim.	2.43	1.24	0.73	1.97	4.40
Ver. + Frode	2.14	1.32	0.76	2.08	4.22
Ver. + Lyon	2.61	1.31	0.71	2.02	4.63
Ver. + Lad. + Clim.	2.66	1.14	0.71	1.85	4.51
Ver. + Lad. + Frode	2.28	1.24	0.81	2.05	4.33
Ver. + Lad. + Lyon	2.70	1.22	0.78	2.00	4.70
Ver. + Las. + Clim.	2.88	1.15	0.56	1.71	4.59
Ver. + Las. + Frode	2.50	1.14	0.49	1.63	4.13
Ver. + Las. + Lyon	2.91	1.19	0.50	1.69	4.60
Ver. + Las. + Clim. + Frode	2.74	1.29	0.64	1.93	4.67
Ver. + Las. + Frode + Lyon	2.64	1.27	0.62	1.89	4.53
Ver. + Las. + Clim. + Lyon	3.00	1.28	0.69	1.97	4.97
Alf. + Red. + Tim. + Or. + Br.	2.55	1.46	0.67	2.13	4.68
Alf. + Red. + Tim.	2.76	1.58	0.67	2.25	5.01
Red. + Tim.	2.50	1.27	0.19	1.46	3.96
L.S.D. - 0.05	.39	.19	.17		.53
C.V.	9.0	9.1	15.6		7.0

HAY & SILAGE MIXTURE TRIAL 1956. LATE GROUP TONS D.M./ACRE 1957.

	Hay	After-	Season
	July 10	math Sept.16	Total
Empire + Essex	2.41	0.46	2.87
Empire + Can. Brome	1.63	0.45	2.08
Ver. + Can. Brome	2.17	1.15	3.32
Ver. + Lyon	2.53	1.30	3.83
Ver. + S-48	2.71	1.27	3.98
Ver. + S-48 + Lyon	2.73	1.24	3.97
Ver. + Las. + Clim. + Lyon	2.85	1.27	4.12
Alf. + Red. + Tim. + Orch. + Brome	2.35	1.30	3.65
Alf. + Red. + Tim.	2.59	1.32	3.91
Red. + Tim.	2.29	1.04	3.33
L.S.D. - 0.05	.28	.14	.36
C.V.	6.6	7.7	6.0

HAY & SILAGE MIXTURE TRIAL 1956. EARLY GROUP.

Mean % of Components, June 18, 1957

MIXTURE	Alfalfa			Red Clover Orchard				Timothy		Brome		Ladino
	Common	Vernal	DuPuits	Common	LaSalle	Common	Frode	Common	Climax	Common	Lyon	
DuPuits + Climax			44.2						55.8			
DuPuits + Frode			61.3				38.7					
DuPuits + Lyon			47.3								52.7	
DuPuits + Lad. + Clim.			35.8						57.2			7.0
DuPuits + Lad. + Frode			43.5				48.9					7.6
DuPuits + Lad. + Lyon			44.2								50.0	5.8
DuPuits + Las. + Clim.			29.8		31.0				39.2			
DuPuits + Las. + Frode			37.6		24.7		37.7					
DuPuits + Las. + Lyon			29.3		34.2						36.5	
DuPuits + Las. + Cl. + Fr.			28.3		34.8		13.0		23.9			
DuPuits + Las. + Fr. + Ly.			33.3		28.1		24.3				14.3	
DuPuits + Las. + Cl. + Ly.			22.9		37.9				27.2		12.0	
Ver. + Las. + Cl. + Ly.		14.5			47.6				24.9		13.0	
Alf. + Red. + Tim. + O. + B.	15.8			40.7		20.6		13.8		9.1		
Alf. + Red + Tim.	14.1			40.8				45.1				
Red + Tim.				45.0				55.0				

HAY & SILAGE MIXTURE TRIAL 1956. MEDIUM GROUP

Mean % of Components, June 25, 1957.

MIXTURE	Alfalfa		Red Clover		Orchard		Timothy		Brome		Ladino
	Common	Vernal	Common	LaSalle	Common	Frode	Common	Climax	Common	Lyon	
Ver. + Clim.		37.0						63.0			
Ver. + Frode		62.4				37.6					
Ver. + Lyon		39.5								60.5	
Ver. + Lad. + Clim.		24.0						63.2			12.8
Ver. + Lad. + Frode		41.3				44.9					13.8
Ver. + Lad. + Lyon		40.8								54.2	5.0
Ver. + Las. + Clim.		13.3		51.0				35.7			
Ver. + Las. + Frode		11.5		65.1		23.4					
Ver. + Las. + Lyon		9.1		48.9						41.9	
Ver. + Las. + Cl. + Frode		13.9		48.0		14.8		23.3			
Ver. + Las. + Fr. + Lyon		14.7		39.8		30.0				15.5	
Ver. + Las. + Cl. + Lyon		11.2		46.6				24.8		17.4	
Alf. + Red. + Tim. + Or. + Br.	8.4		38.2		32.6		11.0		9.8		
Alf. + Red. + Tim.	11.0		43.6				45.4				
Red. + Tim.			42.3				57.7				

HAY & SILAGE MIXTURE TRIAL 1956. LATE GROUP

Mean % of Components. July 10, 1957.

MIXTURE	Alfalfa		Red Clover		Timothy				Brome		Common Orchard	Empire Trefoil
	Common	Vernal	Common	LaSalle	Common	Climax	Essex	S-48	Common	Lyon		
Empire + Essex							65.8					34.2
Empire + Can. Brome									60.9			39.1
Ver. + Can. Brome		55.3							44.7			
Ver. + Lyon		50.3								49.7		
Ver. + S-48		47.3										
Ver. + S-48 + Lyon		56.0						52.7 no S-48 sown		44.0		
Ver. + Las. + Cl. + Lyon		14.4		45.5		26.1				14.0		
Alf. + Red. + T. + Or. + Br.	17.6		32.5		13.8				10.6		25.5	
Alf. + Red. + Tim.	10.9		46.3		42.8							
Red. + Tim.			40.0		60.0							

CONFIDENTIAL -- NOT FOR PUBLICATION

Cooperative Alfalfa Hay-Pasture Trials

Purpose:

Tests were established to demonstrate and evaluate DuPuits, Vernal and Canadian variegated alfalfa under large scale farm plantings in Ontario. Some of the considerations were: to check the winterhardiness and performance of DuPuits and to compare the three varieties under an early hay or silage and aftermath pasture system of management.

Procedure and Results:

Tests were seeded in the counties of Kent, Haldimand, Bruce, Peterboro and Stormont. Each test consisted of three, three acre blocks. Ladino clover (1 lb.) and Frode orchardgrass (6 lbs.) were mixed with DuPuits, Vernal and Canadian variegated alfalfa (10 lbs.).

Each test was visited in the fall of 1956. The establishment of the three varieties is summarized in table 1.

Table 1: Establishment of alfalfa in the Hay-pasture project at five locations in Ontario, October 1956.

County	Establishment		
	DuPuits	Vernal	C. Variegated
Kent*	--	--	--
Haldimand	Good	Fair to Good	Fair
Bruce	Good	Good	Good
Peterboro	Good	Good	Good
Stormont	Excellent	Excellent	Poor to Fair

* not seeded in spring of 1956.

During June, these tests were evaluated for winterhardiness, coarseness and vigor. Yields of hay were obtained from the cooperators. The data are summarized in tables 2 and 3.

Table 2: Characteristics of three varieties of alfalfa in simple mixtures at five locations in Ontario during 1957.

County	Date	DuPuits			Vernal			Can. Variegated		
		Winter ^x Injury	Coarse- ness ^x	Vigo ^x	Winter ^x Injury	Coarse- ness ^x	Vigo ^x	Winter ^x Injury	Coarse- ness ^x	Vigo ^x
Kent*	6/14	-	-	-	-	-	-	-	-	-
Haldimand	6/6	0	10	10	1	7	8	1	6	8
Bruce	6/20	1	9	8	3	6	6	1 ²⁾	10 ²⁾	9 ²⁾
Peterboro	6/17	0	10	7 ¹⁾	0	8	8 ¹⁾	0	7	6
Stormont	6/14	0	10	10	0	6	6	0	8	8
Average		0.2	9.8	9.8	1.0	6.8	7.0	0.2 ³⁾	7.0 ³⁾	7.3 ³⁾

* test not established

x scale = 1 least, 10 most.

1. DuPuits and Vernal alike in favourable areas -- Vernal better in lower areas.
2. Alfa substituted for C. variegated.
3. Average excludes ratings of alfa alfalfa (Bruce county).

Table 3: Yields and botanical composition of mixtures containing varieties of alfalfa during 1957.

County	Crop	Harvest Date	DuPuits				Vernal				Can. Variegated			
			Yield (Tons)	Composition %			Yield (Tons)	Composition %			Yield (Tons)	Composition %		
				Alf.	Lad.	Orch.		Alf.	Lad.	Orch.		Alf.	Lad.	Orch.
Haldimand	Hay	6/24	2.00	57	9	17	1.62	34	26	24	1.75	37	19	34
	Hay	8/7	1.46				1.25				1.25			
Peterboro	Hay	6/20	2.26	43	9	33	2.91	55	8	23	2.50	49	8	26
	Hay	8/15	1.16				0.97				0.87			
Stormont	Hay	6/17	2.70	48	3	38	1.67	46	9	35	2.25	48	7	24
	Hay	8/7	1.60				1.02				1.50			
Average	1st Hay		2.32	49	7	29	2.07	45	14	27	2.17	45	11	28
	2nd Hay		1.41				1.02				1.21			
	1957		3.73				3.09				3.38			

Comments:

1. Winter injury and stands.

Generally stands of the three varieties were good. DuPuits was not adversely effected by winterkilling. Only slight winter injury occurred in the test in Bruce county. Vernal alfalfa winter killed in the same test in localized areas which occurred on the south easterly slopes and on the tops of the hill. In Haldimand county, Vernal and Canadian Variegated were fair to good stands but no winterkilling was evident. In Stormont county, the stand of all three varieties was good. No winterkilling was evident.

2. Adaptation and vigor.

DuPuits alfalfa was more vigorous than either Vernal or Canadian variegated. In Haldimand county, the varieties Vernal and Canadian Variegated were less vigorous than DuPuits but Vernal in particular was in a less favored location on the field. In Peterboro county, the DuPuits was less vigorous than the Vernal in the first crop. The DuPuits plot was on a somewhat rolling portion of the field. On the well-drained sites at this location, the DuPuits exhibited considerable vigor. In the lower areas (areas of poorer drainage), the vigor was reduced below that of Vernal in comparable areas. This cooperator reported favorably on the aftermath recovery of DuPuits by stating "before the second cutting, the DuPuits would be from 4 to 6 inches higher than the Vernal". Similar reports concerning aftermath vigor were received from other cooperators.

3. Yield and botanical composition.

The reported yields from the cooperators showed that DuPuits out-yielded the other two varieties in first crop hay and also in the aftermath (table 3). Generally, there was twice as much legume in the mixtures as there was orchardgrass in the first hay crop. The percentage of legume however, did not vary regardless of the variety of alfalfa used. (56% legume, 29% in DuPuits, 59% legume, 27% orchard in Vernal and 56% legume and 28% orchard in Canadian variegated plots.)

In Haldimand county, however, DuPuits exhibited what appeared to be the most vigorous growth of all the plots of DuPuits and reduced the ladino content to a very low level. (17% below that of the Vernal) This variety also appeared to lower the per cent orchardgrass in the mixture at this location. It is interesting to note that not only DuPuits but Vernal and Canadian variegated had reduced the ladino content of the mixtures to a level which varied from 3 to 9 per cent in Peterboro and Stormont counties.

CONFIDENTIAL--NOT FOR PUBLICATIONCooperative Birdsfoot Trefoil Hay-Pasture TrialsPurpose:

Tests were seeded to evaluate and demonstrate on a field basis Viking birdsfoot trefoil. Some of the considerations were: 1) to compare the yield and quality of Viking and red clover mixtures during the first crop year; 2) to evaluate timothy and brome grass as grasses to be used in mixtures with this legume.

Procedure and Results:

The Viking birdsfoot trefoil tests were located in the counties of Lambton, Lincoln, Wellington, Durham and Carleton. The mixtures used were: 1. Lasalle red clover (7) and Climax timothy (6); 2. Viking (7) and Climax (6); 3. Viking (7); 4. Viking (7) and Canadian brome grass (10); 5. Vernal (4), Viking (6) and Climax (6); and 6. Vernal (4), Lasalle (6) and Climax (6). In each location, mixture numbers 1, 2, 5 and 6 were seeded in two acre blocks. Mixture numbers 3 and 4 were seeded in one acre blocks. In general, the tests were seeded in fields which varied from fair to poor drainage.

The tests were visited in the fall of 1956. Some of the data collected are summarized in table 1.

Table 1: Establishment of legumes in Hay-Pasture project at five locations in Ontario.

County	- Establishment -		
	Viking trefoil	Lasalle red clover	Vernal alfalfa
Lambton	Fair	Fair	Fair
Lincoln	Fair to Good	Poor	Fair to Good
Wellington	Fair	Fair	Fair
Durham	Good	Good	Good
Carleton	Good	Good	Good

These tests were evaluated for winterhardiness, vigour and inoculation in June, 1957. Forage yields were reported by three cooperators. The data are summarized in tables 2 and 3.

Table 2: Characteristics of Viking birdsfoot trefoil in mixtures at five locations in Ontario during 1957.

County	Date	Viking in mixtures with											
		Climax timothy			Can. Bromegrass			alone			Vernal + Climax		
		Winter ^x	Nod. ^o	Vigor	Winter ^x	Nod. ^o	Vigor	Winter ^x	Nod. ^o	Vigor	Winter ^x	Nod. ^o	Vigor
Lambton	6/4	0	N	7	0	N	6	0	N	5	0	N	9
Lincoln	6/6	4*	N	3	3	N	2	3	N	2	4	N	3
Wellington	6/20	8	-	-	8	-	-	8	-	-	9	-	-
Durham	6/17	0	N	8	0	N	8	0	N	8	0	N	8
Carleton	6/13	0	N	7	0	N	7	0	N	6	0	N	8
Average				7.3			7.0			6.3			8.3

Scale = 1 is least; 10 is most.

* Stand poor--spotty.

o N - Nodulated plants.

x Winter injury.

Table 4: Hay yield of Viking birdsfoot trefoil in mixtures at five locations in Ontario during 1957.

County	Crop	Date	Lasalle & Climax			Viking Climax			Viking		Viking Can. Brome			Vernal, Viking Climax			Vernal, Lasalle Climax				
			Hay Tons	%		Hay Tons	%		Hay Tons	%	Hay Tons	%		Hay Tons	%			Hay Tons	%		
				R.Cl.	Tim.		Tref.	Tim.		Tref.		Tref.	Br.		Alf.	Tref.	Tim.		Alf.	R.Cl.	Tim.
Lamb- ton	hay	6/1	3.31	60	30	2.41	10	40	4.74	90	5.13	20	40	2.32	40	5	40	2.32	50	50	5
	hay*	9/3																			
Durham	hay	6/14	1.32	98	2	1.23	68	24	2.53	95	2.17	63	23	0.95	32	35	12	1.12	23	57	13
	seed ^o	--																			
Carle- ton	hay	7/20	2.70	83	16	1.35	25	65	3.60	72	3.60	32	36	3.30	53	23	5	3.30	33	30	12
	past ^x	8/1																			
Average			2.41	80	16	1.67	34	43	3.62	86	3.30	38	33	2.19	41	21	19	2.24	35	46	10

* Aftermath hay crop -- estimate yield $\frac{1}{2}$ of 1st crop.

^o Aftermath seed crop -- ave. red clover 58 lbs./acre.
ave. Viking 75 lbs./acre.

^x Pastured from August 1 - 21.

Comments:

1. Winterhardiness and stands.

In Lincoln and Wellington counties, the stand of all legumes and grasses was materially reduced by the spring of the first crop year. Severe lodging of the cereal crop and prolonged moist conditions were encountered during the establishment period in the Wellington county test. The test was discarded. In Lincoln county, a fair to good stand of all legumes was observed in the fall of the seedling year. In the spring, this stand was reduced materially and the test was discarded.

At the remaining locations, no winterkilling was observed and the plants were well nodulated.

2. Adaptation and Vigor.

In the Vernal-Viking-Climax mixture, the adaptability of Viking to more poorly drained sections was particularly noticeable in Durham county. In the lower areas of the plot and in the dead furrows, the alfalfa stand was thinner and less productive than on higher areas. Viking filled in the areas where alfalfa was either thin or absent. Viking was also distributed quite well throughout the alfalfa areas and appeared vigorous. Viking appeared to be only slightly less vigorous with brome grass than it did with Climax timothy.

3. Yield and botanical composition.

The first crop was removed as hay. No aftermath yields were reported. During this first crop year, the red clover-timothy mixture produced more forage than the Viking-timothy mixture (.7 tons). The red clover predominated in the mixtures (80%) whereas timothy generally contributed more to the yield when mixed with Viking.

When Viking replaced red clover in the alfalfa-timothy mixtures, little difference in yield resulted. The contribution of red clover, however, was greater than Viking, and slightly lowered the timothy component by 9% and alfalfa by 6%.

Higher yields than any other mixture were reported as being obtained from the pure stands of Viking and the Viking-brome grass mixtures. These two mixtures were seeded in plots which were half the size of the other plots which may have been the reason for the obviously high yields.

CONFIDENTIAL -- NOT FOR PUBLICATIONCooperative Timothy Hay-Pasture TrialsPurpose:

Tests were established to demonstrate on a field basis, the use and value of Climax as a medium maturing and leafy variety of timothy. In addition, it was desired to assess the performance and place in a forage program of two English varieties (S-48 and S-51) which have shown promise under plot trials as very late and leafy varieties.

Procedure and results:

Tests were seeded in the counties of Peel, Elgin, Ontario, Simcoe and Prescott in the spring of 1956. Each test consisted of four two-acre plots. Vernal alfalfa (8 lbs.) and ladino clover (1 lb.) were respectively mixed with Climax, Common, S-48 and S-51 (6 lbs.).

The tests were visited in the fall of 1956 to determine the establishment of the four mixtures. Some of the data collected are shown in table 1.

Table 1: Establishment of timothy in the cooperative hay-pasture project, October, 1956.

County	Establishment			
	Climax	Common	S-48	S-51
Peel	Good	Good	Good	Good
Elgin	Good	Good	Good	Good
Ontario	Fair to Good	Fair to Good	Fair to Good	Fair to Good
Simcoe	Good	Good	Good	Good
Prescott*	Good	Good	Good	Good

* Lasalle red clover at 6 pounds was substituted for Vernal.

The tests were visited and evaluated in June, 1957. Botanical samples were removed from each plot. Forage yields were reported by the cooperators. Aftermath pasture days were reported in the fall of the year. The data are summarized in tables 2 and 3.

Table 2: Characteristics of four varieties of timothy in simple mixtures at five locations in Ontario during 1957 -- seeded 1956.

County	Date 1957	Climax			Common			S-48			S-51		
		Winter ^x Killing	Coarse- ^x ness	Leafi- ^x ness	Winter ^x Killing	Coarse- ^x ness	Leafi- ^x ness	Winter ^x Killing	Coarse- ^x ness	Leafi- ^x ness	Winter ^x Killing	Coarse- ^x ness	Leafi- ^x ness
Peel	6/11	0	8	6	0	10	4	0	4	8	0	4	8
Elgin	6/5	0	6	7	0	8	5	0	4	9	0	4	9
Simcoe	6/21	0	6	6	0	8	5	0	2	8	0	2	8
Ontario	6/8	0	6	5	0	8	4	0	3	7	0	3	7
Prescott	6/14	0	6	4	0	8	3	0	5	6	0	5	6
Average		0	6.4	5.6	0	8.4	4.3	0	3.6	7.6	0	3.6	7.6

x = Scale = 1 least, 10 most

Table 3: The yield and botanical composition of mixtures containing varieties of timothy during 1957.

County	Crop	Date	Climax				Common				S-48				S-51				Pasture Days* Per Acre
			Yield	Composition			Yield	Composition			Yield	Composition			Yield	Composition			
				Tim.	Alf.	Lad.		Tim.	Alf.	Lad.		Tim.	Alf.	Lad.		Tim.	Alf.	Lad.	
Feel	Hay	7/4	2.00	24	29	26	2.20	30	34	17	1.90	41	15	19	1.90	48	23	9	26.7
Elgin	Hay	7/5	1.50	25	46	29	1.50	19	66	16	1.25	19	53	23	1.25	6	71	23	28.5
South Limcoe	Hay	7/19	2.80	54	39	4	2.50	57	34	3	2.30	37	39	20	2.30	29	51	16	30.0
Ontario	Hay	-	--	26	67	6	--	17	80	2	--	4	68	24	--	6	70	22	--
Prescott ¹⁾	Hay	-	--	35	49	2	--	19	56	6	--	34	53	2	--	52	31	7	--
Average			2.10	33	46	14	2.06	29	54	9	1.81	27	46	18	1.81	28	49	16	28.4

* pasture days = $\frac{\text{No. cattle} \times \text{no. of days (24 hrs.)}}{\text{No. of acres}}$

1) = red clover substituted for alfalfa in all mixtures.

Comments:

1. Winterhardiness and stands.

Generally, the stands of all the varieties of timothy were good (table 1). No winterkilling was observed at any of the locations.

2. Adaptation and Vigour.

There was no apparent difference in the adaptation of any of the varieties to specific drainage conditions encountered or the environment of Ontario in general. Each variety was able to thrive equally well under comparable drainage conditions. The vigour of the English varieties (S-48 and S-51) was lower than either of the other two varieties under all conditions.

3. Coarseness, leafiness and maturity.

On a field basis, the common variety of timothy appeared to be coarser, less leafy (table 2) and slightly earlier than Climax. At the time of the visits, these characteristics were particularly noticeable. The heads of common timothy had in general, fully emerged whereas in Climax only portions of the heads were visible. Common was coarser as the forage appeared to be made up principally of seed stalks with fewer leaves than Climax.

Little difference could be observed between the two S varieties used. Each appeared to be leafier, however, than Climax and not as coarse. Both these English varieties were later than Climax. Little difference in maturity could be distinguished between S-48 or S-51.

4. Yield and botanical composition.

Generally, the mixtures containing Climax and Common timothy gave similar yields of hay (table 3). Both S-48 and S-51 were similar in yields but were lower in production than either Common or Climax.

The per cent timothy in each mixture was in general similar. The legume and grass per cent varied from 60 to 65 and 27 to 33 per cent respectively. On a field bases however, it appeared that much less timothy was present when either of the two S varieties were used.

The late hay from S-48 and S-51 timothy was reported to be "quite green and the hay was of better quality (July 19) when cut than Common or Climax.

It is interesting to note that in the mixtures containing Common and Climax that the ladino component was reduced to a low level, 3 and 4 per cent respectively, in South Simcoe and Ontario counties. When S-48 and S-51 was used at both locations, the ladino content varied from 16 to 24 per cent. In Prescott county, the ladino in all the mixtures was reduced. In Elgin and Peel counties, good stands of ladino were obtained regardless of the variety of timothy used.

CONFIDENTIAL -- NOT FOR PUBLICATIONCooperative Bromegrass Hay-Pasture TestsPurpose:

Tests were established to demonstrate and assess the following on a field basis:

1. Relative establishment of bromegrass and timothy.
2. Production of brome vs. timothy as grass components in mixtures during the first harvest year.
3. A comparison between Canadian and Lyon bromegrass.
4. To determine the effect of red clover on the establishment and vigour of bromegrass.

Procedure and Results:

Bromegrass tests were needed in the counties of Brant, Huron, Middlesex, Victoria and Renfrew in the spring of 1956. Each test consisted of five two-acre plots. The following mixtures were used:

1. Vernal 8, Ladino 1, Lyon 10.
2. Vernal 8, Can. bromegrass 10.
3. Vernal 8, Lasalle 2, Lyon 10.
4. Vernal 8, Lasalle 2, Can. bromegrass 10.
5. Vernal 8, Lasalle 2, Climax 6.

Each test was visited in the fall of 1956. Some of the data collected are shown in table 1.

Table 1: The establishment of bromegrass in the hay-pasture project at five locations in Ontario, 1956.

County	Establishment of Grass		
	Lyon Brome	C. Common Brome	Climax Timothy
Middlesex	Poor	Poor	Poor
Brant	Good	Good	Good
Huron	Good	Good	Good
Victoria	Good	Good	Good
Renfrew	Good	Good	Good

During June, 1957, these tests were evaluated for winter injury, leafiness and vigour. Yields of hay and aftermath were reported by the cooperators. The data are summarized in tables 2 and 3.

Table 2: Characteristics of varieties of bromegrass in simple mixtures at five locations in Ontario during 1957.

County	Date	Lyon			Common			Climax Timothy	
		Winter Injury	Leafiness x	Vigor x	Winter Injury	Leafiness x	Vigor x	Winter Injury	Vigor x
Middlesex	6/3	—*	10	9	—*	6	7	—*	8
Brant	6/10	0	7	8	0	6	6	0	7
Huron	6/20	0	6	8	0	5	8	0	8
Victoria	6/18	0	7	6	0	4	8	0	10
Renfrew	6/13	1	6	8	1	5	10	0	8
Average		0.2	7.2	7.8	0.2	5.2	7.8	0	8.2

* Poor original stand.

x Scale = 1 least, 10 most.

Table 3: Yield and botanical composition of five mixtures containing varieties of bromegrass at five locations in Ontario during 1957.

County	Crop	Date	1						2			3				4				5				Pas- ture Days
			Yld.	Composition			Yld.	Composition		Yld.	Composition			Yld.	Composition			Yld.	Composition					
				Alf.	Lad.	Lyon		Alf.	Can. Br.		Alf.	Red	Lyon		Alf.	Red	Can. Br.		Alf.	Red	Tim.			
Middle- sex °	Hay	6/11	1.27	10	5	85	1.00	30	70	1.14	20	20	60	1.06	30	20	50	1.20	30	20	50	10.0		
	Hay	8/21	.86	-	-	-	1.00	-	-	1.34	-	-	-	1.08	-	-	-	1.34	-	-	-			
Brant	Hay	6/15	1.20	55	11	27	1.40	50	47	1.63	21	43	30	1.47	24	56	18	1.54	40	4	54			
Huron	Hay	6/17	2.13	79	12	8	2.36	67	26	2.31	65	22	12	2.22	46	28	21	2.56	35	15	44			
	Hay	8/14	1.73	-	-	-	1.92	-	-	1.74	-	-	-	1.83	-	-	-	1.70	-	-	-			
Victor- ia	Hay	7/3*	-	38	27	18	-	72	12	-	52	28	17	-	53	37	6	-	45	15	26			
	Hay	9/3	1.50	-	-	-	1.35	-	-	1.35	-	-	-	1.35	-	-	-	1.12	-	-	-			
Renfrew	Silage ^x	7/25	1.65	61	4	35	1.65	70	8	1.82	39	36	25	2.20	29	30	6	2.47	38	49	13			
	Hay	9/19	-	80	5	15	-	75	25	.50	60	30	10	.50	50	40	10	.50	45	40	15			
Average	1st. Hay		1.56	51	11	31	1.61	61	31	1.72	43	30	26	1.74	39	35	19	1.94	39	24	34			
	2nd. Hay		1.36				1.75			1.23				1.19				1.67						
	1957		2.92				3.36			2.95				2.93				3.61						

* Average yield 3.24 tons per acre.

x Loads of grass silage.

o Establishment of components variable.

Comments:

1. Winterhardiness and stands.

In general, the establishment of the brome-grass varieties was satisfactory (table 1). In one location, the establishment was poor due to the lodging of the companion crop. In the spring of the crop year, no winterkilling was evident. Red clover in a mixture generally suppressed the contribution of brome-grass to the mixture. There did not appear to be fewer plants of brome-grass in the mixtures where red clover was added but the vigour did appear to be lower and consequently contributed less to the mixture.

2. Adaptation and vigour.

Lyon and Canadian brome-grass were equally able to withstand conditions of variable drainage in fields. Each variety established well in low areas of tests and appeared to be producing well. There appeared to be little difference in the vigour of either variety at the time of visitation. Aftermath vigour was not observed.

3. Characteristics -- leafiness and coarseness.

Lyon brome-grass was slightly leafier and somewhat coarser than the Canadian brome-grass. (Table 2)

4. Yields and botanical composition.

The first crop was generally removed as hay. At this time the mixture containing timothy outyielded similar mixtures containing either Lyon or Canadian brome-grass. The contribution of timothy to the mixture was approximately 6% higher than the average contribution of both brome-grasses. The Canadian brome-grass, however, contributed less (19%) than the Lyon (26%) when in mixtures with alfalfa and red clover.

Where ladino was used in place of red clover, the total yields were slightly less in the first cut (400 lbs.). The contribution of Lyon brome-grass was slightly increased (5%) and alfalfa was increased about 8% when ladino was used.

The second harvest was taken off as hay. The highest aftermath production was harvested from the simple mixture of alfalfa and Canadian brome-grass.

CONFIDENTIAL -- NOT FOR PUBLICATIONCooperative Orchardgrass Hay-Pasture TrialsPurpose:

The orchardgrass project was instituted to assess the use and value of later and leafier strains of orchardgrass on a field basis managed as early hay or silage and aftermath pasture.

Procedure and Results:

The orchardgrass tests were seeded in the counties of Essex, Oxford, North Simcoe, Hastings and Russell. The fields used were fairly uniform in drainage. Each test consisted of three three-acre plots. Frode, S-37 and Common orchardgrass at six pounds per acre were mixed individually with Vernal alfalfa at eight pounds and ladino at one pound per acre. The tests were visited in the fall of 1956. Some of the data on establishment is shown in table 1.

Table 1: The establishment of orchardgrass in the hay-pasture trials at five locations in Ontario, fall, 1956.

County	Establishment		
	Common	Frode	S-37
Essex	Good	Good	Good
Oxford	Excellent	Excellent	Excellent
N. Simcoe	Fair to Good	Fair to Good	Fair to Good
Hastings	Good	Good	Good
Russell	Excellent	Excellent	Excellent

During June (1957), the varieties were evaluated under field conditions. Yields of hay or silage were obtained from the cooperators. Aftermath hay and/or pasture days were obtained during the fall of 1957. Some of the data obtained are summarized in tables 2 and 3.

Table 2: Characteristics of three varieties of orchardgrass in simple mixtures at five locations in Ontario during 1957.

County	Date 1957	Frode			Common			S-37		
		Winter* Injury	Coarseness*	Leafiness*	Winter* Injury	Coarseness*	Leafiness*	Winter* Injury	Coarseness*	Leafiness*
Essex	6/11	0	5	6	0	7	3	0	2	9
Oxford	6/10	0	8	6	0	10	2	0	5	8
N. Simcoe	6/21	0	8	5	0	10	3	0	4	7
Hastings	6/17	0	8	7	0	10	4	0	5	6
Russell	6	0	3	7	0	8	3	0	2	8
Average		0	6.4	6.2	0	9.0	3.0	0	3.6	7.6

* Scale = 1 least, 10 most.

Table 3: The yield and botanical composition of mixtures containing varieties of orchardgrass during 1957.

County	Crop	Date 1957	Frode				Common				S-37				Aftermath Pasture Days ^x Per Acre
			Yield (Tons)	Composition*			Yield (Tons)	Composition*			Yield (Tons)	Composition*			
				Orch.	Alf.	Lad.		Orch.	Alf.	Lad.		Orch.	Alf.	Lad.	
Essex	Hay	6/12	1.76	60	25	15	1.76	40	45	15	1.70	40	50	10	115
Oxford	Hay	6/24	2.05	61	19	16	2.34	64	14	18	1.75	37	32	27	54
North Simcoe	Hay	6/22	1.15	49	42	2	1.15	58	40	1	1.91	48	46	6	---
	Hay	8/29	0.78	--	--	--	0.88	--	--	--	1.03	--	--	--	---
Hastings	Hay	----	1.25	14	57	17	1.28	26	37	22	1.34	3	47	37	160
Russell	Silage ^o	7/10	1.83	38	20	13	2.08	34	26	6	2.33	21	36	14	oo
Average	Hay		1.55	45	33	13	1.63	45	33	13	1.68	30	42	19	110

$x = \frac{\text{No. of cattle} \times \text{No. of days (24 hrs.) on pasture}}{\text{No. of acres}}$

* Residual percentage comprised of weeds and other crop plants.

^o Yield of plots in tons going into silo.

^{oo} Pastured from July 20 to September 10.

Comments:

1. Winterhardiness and stands.

Generally, the stands of the three varieties of orchardgrass were good. No winterkilling was observed at any of the locations.

2. Adaptation.

There was no apparent difference in the ability of any of the three varieties to withstand poor drainage. All tests were on fairly uniform areas of well-drained soil.

3. Vegetative characteristics - coarseness, leafiness and maturity.

In general, common orchardgrass was found to be coarser with less leaf (table 2) and earlier than Frode or S-37. Common orchard produced considerably more seed heads and the forage appeared to be poorer in quality than Frode. S-37 had fewer seed heads and was finer than Frode.

4. Yield and botanical composition.

In all but one case, the first crop was harvested as hay. The reported yields indicated that in general, Frode and Common orchardgrass were similar in production (table 3). In three locations (North Simcoe, Hastings and Russell counties) the mixture containing S-37 orchardgrass reportedly outyielded Frode or common orchardgrass.

In this first crop, the Frode and common orchardgrass contributed as much to the mixture as did the legumes. (Frode and common mixtures: 46% legume, 54% orchardgrass.) The contribution of S-37 to the mixture however, was approximately 15% less than either of the other two orchardgrass varieties.

The aftermath was pastured except in one location. An average of 110 pasture days per acre was obtained. In one location, it was reported and observed that the cattle preferred common orchardgrass to either Frode or S-37. The animals grazed common to the fullest, the Frode only about 20% and the S-37 the least. It was reported from Russell county that "Frode orchardgrass was not grazed as closely as other plots". Whereas in Hastings county "there was no noticeable cattle preference over S-37 and both were preferred to common orchardgrass.

Methods of Seeding Alfalfa and Bromegrass

R.P.O. 33-7

Outline in 1955 report

Stand - Plants/Sq. Ft.

Yield - Tons

	1955 Stand		1956 Hay		1957 Hay			
	Alfalfa	Brome	Total Yield	Percent Brome 1st cut	First cut	Percent Brome 1st cut	Second cut	Total yield
Grain drill, harrow	12.6	2.3	2.95	19.0	2.43	55.2	0.81	3.24
Grain drill, pack before	20.2	2.2	2.94	14.0	2.53	56.9	0.85	3.38
Grain drill, pack after	16.3	2.2	2.90	24.3	2.46	63.7	0.85	3.31
Grain drill, pack before and after	20.2	3.0	2.86	27.2	2.41	52.9	0.72	3.13
Brillion seeder	21.8	0.8	2.75	2.4	2.30	14.4	0.84	3.14
Band seeder	14.7	2.5	2.63	20.4	2.59	58.5	0.78	3.37
Band seeder pack after	16.1	2.6	2.75	17.0	2.56	54.5	0.66	3.22
	3.2	0.9	N.S.		N.S.		N.S.	N.S.
	4.2	1.2	-		-			-
	17.9	40.6	5.0		6.1		18.1	7.9

Methods of Seeding with a Grain Drill

R.P.O.: F.H. 33-8

Stand - Plants/Sq. Ft.

Outline in 1956 Report

Yield - Tons

Treatment			1957 Stand			1956 Stand - 1957 Hay Yield						
Alfalfa	Brome	Soils	Alfalfa	Brome	Total stand	Alfalfa	Brome	Total stand	First cut	Percent brome 1st cut	Second cut	Total Yield
Before hoe	shallow		23.0	9.0	32.1	10.5	4.7	15.4	1.84	36.0	0.93	2.78
After hoe	shallow		27.7	8.6	36.3	8.5	8.1	16.8	1.72	41.1	0.82	2.54
After hoe	shallow	pack	27.3	8.5	35.9	10.1	8.3	19.6	1.64	41.9	0.86	2.50
After hoe	shallow	harrow	27.0	8.0	35.0	10.9	8.5	19.4	1.77	30.2	0.95	2.72
After hoe	regular		25.9	7.3	33.2	5.0	5.1	10.6	1.30	41.9	0.64	1.94
With oats	shallow		30.6	8.7	39.3	8.4	7.1	15.8	1.71	34.7	0.87	2.58
With oats	regular		27.3	10.4	37.8							
With oats	regular	harrow	23.0	6.1	29.1	10.1	4.7	15.4	1.75	30.9	0.84	2.59
Band	shallow		28.5	9.1	37.6	7.4	7.3	14.8	1.63	39.7	0.77	2.40
After hoe	broadcast	harrow	21.3	16.4	37.8							
L.S.D.		(.05)	5.4	3.1	4.1	2.4	1.1	3.1	N.S.		.10	.37
		(.01)	-	4.2	-	3.3	1.5	4.4	-		.14	-
C.V.			14.3	23.5	11.9	18.8	10.4	13.0	12.7		8.3	9.9

Management Practices on New Seedings

R.P.O. 33-11

Outline in 1956 report

Stand - Plants/Sq. Ft.

Yield - Tons

	1957 Stand			1956 Stand - 1957 Hay				
	Alfalfa	Brome	Total	Alfalfa	Brome	Total	First cut	% Brome First Cut
Clip early, left	29.0	6.5	35.5	8.0	5.0	13.0	0.81	63.0
Clip early, remove	30.3	8.7	39.0	8.0	5.7	13.7	0.77	54.0
Clip early, remove, fert.	30.3	7.8	38.2	7.8	4.2	12.6	0.94	54.5
Clip late, left	26.5	6.9	33.4	8.3	5.8	14.2	0.78	61.2
Clip late, remove	26.5	5.9	32.4	8.5	5.2	13.7	0.79	57.9
Unclipped	31.3	6.8	38.2	6.8	5.4	12.9	0.89	64.7
L.S.D. - .05	N.S.	1.9	N.S.	N.S.	1.3	N.S.	N.S.	N.S.
.01	-	-	-	-	-	-	-	-
C.V.	17.5	18.0	15.1	17.0	13.0	12.8	13.1	-

Band Seeding

R.P.O. F.H. 33-13

Stand - Plants/Sq. Ft.

Outline in 1956 report

Yield - Tons

	1957 Stand			1956 Stand - 1957 Hay						
	Alfalfa	Brome	Total stand	Alfalfa	Brome	Total stand	First cut	Percent brome 1st cut	Second cut	Total Yield
Band	24.0	8.2	32.2	8.4	5.4	13.9	1.88	39.8	0.67	2.55
Band 2" above	-	-	-	9.9	5.1	15.0	1.88	44.2	0.62	2.50
Band $\frac{1}{2}$ " below	23.9	6.1	30.0	8.8	5.8	14.6	2.02	40.7	0.71	2.73
Band harrow	24.1	7.4	31.5	9.3	7.9	17.2	2.06	45.5	0.72	2.78
Band pack	23.0	8.8	31.9	10.3	6.0	16.3	2.04	39.7	0.73	2.77
Band 16" drills	24.9	6.7	31.6	10.5	8.1	18.6	1.90	49.8	0.69	2.59
Band no oats	26.9	8.3	35.2	10.5	11.5	22.0	2.34	47.5	0.69	3.03
Broadcast harrow	25.5	6.8	32.3	12.5	6.3	18.7	2.14	39.2	0.76	2.90
L.S.D. (.05)	N.S.	1.5	N.S.	N.S.	2.2	4.8	N.S.		N.S.	0.31
(.01)	-	-		-	3.0	-	-		-	-
C.V.	15.9	14.0	12.6	21.2	21.3	19.3	9.3		8.1	7.9

Seed Bed Firming and Coverage

R.P.O. - F.H. 33-15

Stand - Plants/Sq. Ft.

Outline in 1956 report

Yield - Tons

	1957 Stand			1956 Stand - 1957 Hay Yields						
	Alfalfa	Brome	Total stand	Alfalfa	Brome	Total stand	Percent grass in 1st cut	First cut	Second cut	Total Yield
Pack before	23.4	6.8	30.2	11.2	6.7	17.9	34.0	1.92	0.89	2.81
Pack after	24.3	6.7	31.1	13.3	7.9	21.2	27.2	2.15	0.94	3.09
Pack before and after	32.6	7.2	39.9	16.2	7.9	24.0	27.1	2.24	0.96	3.20
Pack before, harrow after	28.3	7.8	36.1	15.2	8.4	23.6	29.3	2.24	0.95	3.19
Harrow	28.6	10.4	39.0	12.7	7.2	19.9	30.5	2.13	0.92	3.05
Band	23.6	7.5	31.1	9.9	7.9	17.9	34.7	1.98	0.86	2.84
Chains	27.8	7.4	35.3	10.5	6.2	16.7	34.5	1.94	0.88	2.82
Check	26.8	6.6	33.4	10.3	7.8	18.1	36.7	2.03	0.84	2.87
L.S.D. (.05)	4.3	1.7	5.5	2.9	N.S.	3.7		N.S.	N.S.	0.33
(.01)	-	2.3	-	4.0		5.0		-	-	-
C.V.	25.2	32.8	22.9	16.1	14.8	12.6		9.1	8.8	7.6

Companion Crop Management

R.P.O. 33-14

Outline in 1956 report

Stand - Plants/Sq. Ft. Yield - Tons

Management	1957 Stand			1956 Stand - 1957 Hay Yield						
	Alfalfa	Brome	Total Stand	Alfalfa	Brome	Total Stand	Percent grass in 1st cut	First Cut	Second cut	Total yield
Oats cut 10" left	20.2	12.8	33.1	12.2	18.7	30.8	73.4	2.60	1.33	3.93
Oats cut 24" left	21.4	10.8	32.2	13.4	17.6	31.0	73.2	2.75	1.30	4.05
Oats cut 24" removed	21.6	13.1	34.7	14.2	20.2	34.4	75.5	2.60	1.34	3.94
Oats hay	24.9	12.6	37.5	13.7	21.4	35.1	63.8	2.58	1.29	3.87
Oats 14" grain	23.9	11.7	35.6	15.0	20.2	35.2	67.7	2.86	1.36	4.22
Oats grain	22.6	9.1	31.8	14.2	19.2	33.4	58.2	2.61	1.48	4.09
Barley grain	23.2	7.0	30.2	17.4	13.4	30.9	50.1	2.48	1.53	4.01
Mixed grain	25.4	10.5	35.9	-	-	-	-	-	-	-
No companion	23.8	11.6	34.9	20.2	20.2	40.3	78.7	2.83	1.38	4.21
L.S.D. (.05)	N.S.	2.8	N.S.	4.5	4.3	6.2		N.S.	0.12	N.S.
(.01)	-	3.6	-	-	-	-		-	-	-
	12.8	16.7	11.8	20.4	15.6	12.4		7.9	6.3	6.2

Forage Seedings on Winter Wheat

R.P.O.: F.H.-10 - Outline in 1956 report.

R.P.O.: F.H.-16 - Outline in 1956 report.

The crop of winter wheat seeded in the fall of 1956 yielded 65 bushels per acre. This heavy crop probably had an unfavourable effect on the establishment studies.

The fall seedings established only small plants before freeze-up. Many of the alfalfa and trefoil plants did not come through the winter. The plants which did survive were weakened to the point where further competition with the wheat crop killed them. The grasses also established poorly in the fall with the exception of timothy in the wide wheat drills.

The spring seedings established much better than the fall plantings. Plots mulched with manure and straw however, lodged severely and killed the alfalfa seedlings.

Fall Seeding Forage Crops on Winter Wheat

Plants per Square Foot

Seeding Method	Alfalfa 10 - Brome 10		Seeding Method	Trefoil 7 - Timothy 5	
	Alfalfa	Brome		Trefoil	Timothy
Band 8" drills	6.7	4.5	Band 8" drills	0.4	5.0
Band 16" drills	4.0	1.5	Band 16" drills	0	7.0
Broadcast	5.6	5.0	Broadcast, harrow	0	1.0
Broadcast, harrow	5.3	2.5	Drilled	0	1.0
Broadcast by hand, harrow	6.4	4.0	Broadcast in spring	1.7	1.0
Broadcast in spring	4.1	1.0			
L.S.D. .05	2.0				
C.V.	33.0				

Spring Seed Forage Crops on Winter Wheat

Plants per Square Foot

Rate Seeding Alfalfa			Species Establishment		
Rate	Stand		Species	Stand	
	1956	1957		1956	1957
8 alfalfa	13.7	2.2	alfalfa	20.5	8.0
10 alfalfa	16.8	3.4	red clover	27.0	14.0
12 alfalfa	19.9	4.0	trefoil	13.0	21.8
14 alfalfa	23.7	7.5	timothy	14.1	2.0
16 alfalfa	25.1	7.5	orchard	13.0	18.6
10 red clover	30.3	13.9	brome	3.0	7.1
			meadow fescue	9.6	7.5
	8.6	3.9			
	11.9	5.4			
	26.3	42.9			

EFFECT OF ROW SPACINGS AND RATES OF SEEDING
UPON THE SEED YIELD OF TIMOTHY AND ORCHARD GRASS

R.P.O. F.H. 14-3

Objections - Outlined in 1955 report

Procedure - Outlined in 1957 report

Results and Discussion - To be published

TABLE 1
TIMOTHY SEED YIELD IN POUNDS PER ACRE

Rate Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7	14	21	28	35				
2½	243.4	343.3	341.5	384.6	341.3	330.8	363.7	319.0	309.8
5	235.2	338.9	337.2	381.4	347.2	328.1	337.3	329.0	318.0
7½	241.2	343.9	343.7	362.2	336.0	328.1	343.5	328.0	312.8
10	228.3	332.0	329.6	375.9	344.1	321.7	321.3	324.0	319.3
3 year spacing mean	237.0	340.1	337.9	376.0	341.9	326.6			
1955 spacing mean	278.4	352.2	382.5	358.2	335.0		341.4		
1956 spacing mean	243.7	361.0	335.8	357.1	319.7			323.5	
1957 spacing mean	189.0	307.1	295.5	412.0	370.2				314.9

	Rate Mean		Spacing Mean		Rate x Spacing		C.V.
	0.5	0.1	0.5	0.1	.05	.01	
1955	23.3	36.1	58.2;		N.S.		9.1
1956	N.S.		53.5;		N.S.		9.4
1957	N.S.		45.6;	63.9	N.S.		11.4
3 year mean	N.S.		42.1;	58.7	N.S.		4.9

TABLE 2

TIMOTHY Seed Culm Numbers per Square Foot

Rate Seeding	Row Spacing					2 year row mean	1956 row mean	1957 row mean
	7	14	21	28	35			
2½	46.8	70.5	49.7	47.3	40.2	50.9	51.2	50.0
5	46.9	61.3	48.1	45.2	37.4	47.8	49.2	46.5
7½	46.5	66.1	47.8	46.1	40.0	49.3	49.9	48.8
10	50.3	70.3	46.3	44.9	40.7	50.5	48.9	52.2
2 year spacing mean	47.6	67.0	48.0	45.9	39.6	49.6		
1956 spacing mean	54.4	64.9	48.2	44.7	38.8		49.3	
1957 spacing mean	40.9	69.3	47.8	46.3	42.4			49.3

	Rate Mean		Spacing Mean		Rate x Spacing		C.V.
	.05	.01	.05	.01	.05	.01	
1956	N.S.		10.7	15.0	N.S.		9.7
1957	N.S.		8.5	12.0	N.S.		15.4
2 year mean	N.S.		9.3	13.0	N.S.		8.5

TABLE 3
TIMOTHY Panicle Length in Cms.

Rate Seeding	Row Spacing					2 year row mean	1956 row mean	1957 row mean
	7	14	21	28	35			
2½	6.9	7.4	7.6	7.6	7.9	7.5	7.0	8.1
5	6.1	6.9	7.0	7.7	8.0	7.2	6.8	7.6
7½	6.6	6.9	7.2	8.7	7.8	7.4	6.9	8.0
10	6.6	6.9	7.0	7.9	7.8	7.2	6.7	7.8
2 year spacing mean	6.5	7.0	7.2	8.0	7.9	7.3		
1956 spacing mean	6.5	6.8	6.8	7.2	7.1		6.9	
1957 spacing mean	6.7	7.3	7.7	8.8	8.7			7.8
	Rate mean		Spacing mean		Rate x Spacing		C.V.	
	.05	.01	.05	.01	.05	.01		
1956	N.S.		.3	--	N.S.		4.3	
1957	N.S.		.6	1.2	Sig.		6.7	
2 year mean	.3	--	.2	.3	N.S.		4.9	

TABLE 4
TIMOTHY Weight of 1000 Seeds in MGM.

Rate Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7	14	21	28	35				
2½	322.9	338.9	353.2	355.6	379.8	350.1	327.2	363.2	359.9
5	331.8	330.0	351.1	345.4	370.5	345.8	326.9	366.6	356.4
7½	332.1	343.3	348.9	366.4	363.9	350.9	327.2	367.0	358.6
10	342.1	339.0	360.8	361.2	358.1	352.2	336.9	364.6	358.1
3 year spacing mean	332.2	337.7	353.5	357.1	368.1	349.7			
1955 spacing mean	304.4	317.3	330.8	352.2	342.7		329.6		
1956 spacing mean	346.3	351.0	370.8	367.3	391.1			365.3	
1957 spacing mean	346.0	344.7	359.0	371.3	370.3				341.6
	Rate mean		Spacing mean		Rate x Spacing		G.V.		
	.05	.01	.05	.01	.05	.01			
1955	N.S.		15.9	23.0	N.S.		5.4		
1956	N.S.		7.7	10.8	N.S.		6.4		
1957	N.S.		9.4	13.2	N.S.		6.2		
3 year mean	N.S.		10.7	14.9	N.S.		4.0		

TABLE 5
TIMOTHY Percent Establishment in Soil *

Rate of Seeding	Row Spacing					3 year mean	1955 row mean	1956 row mean	1957 row mean
	7	14	21	28	35				
2½	68.8	67.2	73.2	67.4	69.2	69.2	62.3	68.6	76.6
5	72.2	68.4	73.0	68.4	67.1	69.8	60.6	73.8	75.4
7½	74.4	68.0	66.9	64.2	62.4	67.2	62.0	69.2	70.6
10	73.3	65.8	63.6	69.0	67.0	67.9	62.5	70.6	70.6
3 year mean	72.2	67.2	69.2	67.2	66.6	68.5			
1955 spacing mean	65.6	63.3	63.8	55.1	61.1		61.8		
1956 spacing mean	73.0	66.0	72.5	72.5	68.7			70.5	
1957 spacing mean	78.2	72.0	71.5	74.5	70.2				73.3

	Rate Mean		Spacing Mean		Rate x Spacing		C.V.
	.05	.01	.05	.01	.05	.01	
1955	N.S.		N.S.		N.S.		9.7
1956	N.S.		N.S.		N.S.		7.3
1957	N.S.		sig.	--	N.S.		9.4
3 year mean	N.S.		sig.	--	sig.	--	4.0

* Analysis completed on transformed data

TABLE 6
HEIGHT TIMOTHY SEEDLINGS 45 DAYS AFTER PLANTING (CMS)

Rate of Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7"	14"	21"	28"	35"				
2½	12.0	12.1	10.1	12.5	12.9	11.9	17.0	9.6	9.0
5	12.9	12.1	11.6	12.0	11.9	12.1	17.0	10.4	8.9
7½	13.1	12.6	12.1	12.8	10.8	12.3	18.3	9.7	8.9
10	12.3	12.7	12.2	11.8	10.8	12.0	17.1	10.1	8.7
3 year spacing mean	12.6	12.4	11.5	12.3	11.6	12.1			
1955 spacing mean	17.9	17.6	16.1	18.6	16.5		17.3		
1956 spacing mean	10.0	9.7	9.8	10.2	10.0			9.9	
1957 spacing mean	9.7	9.7	8.5	8.0	8.1				8.8

	Rate Mean		Spacing Mean		Rate x Spacing		C.V.
	.05	.01	.05	.01	.05	.01	
1955	--	--	--	--	--	--	14.4%
1956	--	--	--	--	--	--	9.7%
1957	--	--	0.62	0.91	--	--	6.7%
3 year mean	--	--	--	--	--	--	7.1%

TABLE 7

Variance Table Showing the F Values for the Isolation of the Linear and Quadratic Components of the Spacing Sum of Squares with TIMOTHY

	D.F.	Seed Yield	Culm Numbers	Panicle length	Weight 1000 seeds	Establish ment in soil	Seedling height
Spacings	4	14.20**	11.19**	8.46**	17.13**	3.90*	1.45
Linear	1	31.11**	14.60**	30.40**	66.51**	7.51*	2.63
Quadratic	1	20.22**	8.92*	1.40	0.01	0.94	0.18
Dev. from reg.	2	2.73	10.62**	14.40*	30.94**	1.98	1.50

TABLE 8

Correlation of Some Yield and Plant Characteristics in Timothy

Seed yield and panicle length		+ .229
Seed yield and culm number		+ .007
1000 seed weight and seed yield		+ .183
1000 seed weight and panicle length		+ .782
1000 seed weight and culm number		- .543
Panicle length and culm number		- .411
Establishment and seed yield		- .167
Establishment and 1000 seed weight		- .388
Establishment and panicle length		- .485
Establishment and culm number		- .031
Seedling height and seed yield		- .082
Seedling height and 1000 seed weight		- .212
Seedling height and panicle length		- .302
Seedling height and culm numbers		+ .249
Seedling height and establishment		+ .030
Significant values of r	.05 .01	.444 .561

TABLE 9

ORCHARD GRASS SEED YIELD IN POUNDS PER ACRE

Rate of Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7"	14"	21"	28"	35"				
2½	161	169	180	239	228	196	128	293	164
5	165	209	209	218	208	202	169	292	144
7½	190	225	207	213	197	206	181	297	141
10	197	223	209	223	196	210	173	299	157
12½	198	200	206	218	191	202	163	302	143
15	195	200	203	204	191	199	146	301	149
3 year spacing mean	184	204	203	219	202	202			
1955 spacing mean	216	196	140	129	119		160		
1956 spacing mean	273	324	318	301	270			297	
1957 spacing mean	64	93	150	226	217				150

	Rate Mean		Spacing Mean		Rate x Spacing		C.V.
	.05	.01	.05	.01	.05	.01	
1955	27.5	36.6	31.0	43.4	61.5	81.9	27.3%
1956	N.S.	N.S.	40.5	N.S.	N.S.	N.S.	9.8%
1957	16.6	N.S.	39.1	54.9	N.S.	N.S.	17.6%
3 year mean	8.5	N.S.	20.4	N.S.	19.0	25.2	6.7%

TABLE 10
ORCHARD GRASS CULM NUMBERS PER SQUARE FOOT

Rate of Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7"	14"	21"	28"	35"				
2½	37.4	37.8	31.9	27.2	23.9	31.6	16.7	25.6	42.7
5	40.0	41.1	35.8	25.7	20.4	32.6	21.0	26.0	41.7
7½	42.5	41.1	34.1	25.2	21.1	32.8	21.2	26.6	39.3
10	42.5	37.8	26.5	24.1	21.2	30.4	21.0	25.5	38.6
12½	38.3	39.1	29.6	24.6	22.3	30.8	17.8	26.4	39.8
15	37.7	37.7	30.3	24.4	19.9	30.0	17.0	26.5	38.2
3 year spacing mean	39.7	39.1	31.4	25.2	21.5	31.4			
1955 spacing mean	38.4	22.7	13.3	11.8	9.3		19.1		
1956 spacing mean	21.1	38.3	32.5	20.3	18.4			26.1	
1957 spacing mean	52.7	43.8	37.4	35.0	30.2				40.0

	Rate .05	Mean .01	Spacing Mean		Rate x Spacing		C.V.
			.05	.01	.05	.01	
1955	2.8	3.8	2.2	3.2	0.4	0.4	23.7%
1956	N.S.	N.S.	8.7	12.7	N.S.	N.S.	11.1%
1957	3.2	N.S.	5.2	7.3	N.S.	N.S.	12.8%
3 year mean	1.7	N.S.	3.6	5.2	N.S.	N.S.	7.5%

TABLE 11
WEIGHT OF ORCHARD GRASS SEED PER PANICLE MGMS.

Rate of Seeding	Row Spacing					2 year rate mean	1956 rate mean	1957 rate mean
	7"	14"	21"	28"	35"			
2½	153.0	165.0	171.0	232.5	287.5	201.8	284.4	119.2
5	137.0	151.5	225.5	229.0	240.5	196.7	271.6	121.8
7½	133.0	159.5	170.5	218.5	209.5	178.2	243.3	107.6
10	175.5	134.5	195.0	220.0	235.5	192.1	268.2	113.0
12½	153.5	167.5	208.5	218.5	236.5	196.9	286.4	107.4
15	142.5	177.0	214.0	210.5	261.0	201.0	282.4	113.8
2 year spacing mean	149.1	159.2	197.4	221.5	245.1	194.5		
1956 spacing mean	233.7	244.7	290.1	293.7	306.0		273.6	
1957 spacing mean	64.5	63.8	104.7	149.3	181.7			113.8

	Rate .05	Mean .01	Spacing .05	Mean .01	Rate x Spacing .05 .01	C.V.	
1957	N.S.	N.S.	22.9	32.2	N.S.	N.S.	21.3%

TABLE 12
ORCHARD GRASS WEIGHT OF 1000 SEEDS IN MGM.

Rate of Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7"	14"	21"	28"	35"				
2½	1184.4	1168.2	1164.3	1198.8	1221.5	1187.4	1253.2	1058.3	1250.1
5	1167.5	1160.5	1194.7	1198.9	1213.2	1186.9	1244.8	1054.5	1261.3
7½	1155.3	1202.8	1206.1	1206.1	1198.9	1193.8	1244.2	1056.7	1230.8
10	1161.8	1167.3	1211.0	1186.5	1196.8	1184.7	1224.6	1067.6	1261.6
12½	1160.9	1199.7	1230.1	1199.4	1191.6	1196.3	1228.8	1101.4	1258.9
15	1159.5	1174.7	1214.9	1216.3	1188.7	1190.8	1211.0	1099.3	1262.3
3 year spacing mean	1164.9	1178.9	1203.5	1201.0	1201.8	1190.0			
1955 spacing mean	1160.3	1210.0	1256.8	1274.2	1270.7		1234.4		
1956 spacing mean	1074.1	1051.3	1055.1	1084.4	1099.5			1072.8	
1957 spacing mean	1259.8	1274.7	1298.8	1244.3	1234.9				1262.5

	Rate Mean		Spacing Mean		Rate x Spacing		C.V.
	.05	.01	.05	.01	.05	.01	
1955	26.0	N.S.	54.0	76.0	N.S.	N.S.	?
1956	36.0	N.S.	N.S.	N.S.	N.S.	N.S.	5.3%
1957	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	3.3%
3 year mean	N.S.	N.S.	16.0	N.S.	N.S.	N.S.	2.1%

TABLE 13
ORCHARD GRASS PERCENT ESTABLISHMENT IN SOIL *

Rate of Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7"	14"	21"	28"	35"				
2½	76.4	79.0	80.3	75.0	79.8	78.1	72.5	77.7	84.0
5	74.8	75.9	79.1	76.9	80.0	77.3	73.3	74.7	83.9
7½	74.6	80.3	77.4	79.8	76.1	77.6	71.3	76.4	85.1
10	78.1	77.2	79.9	76.2	75.1	77.3	74.7	76.2	80.9
12½	80.1	76.2	82.8	79.6	71.8	78.1	74.5	77.7	81.9
15	77.2	78.5	82.4	79.0	75.9	78.6	75.1	77.3	83.4
3 year spacing mean	76.9	77.8	80.3	77.7	76.4	77.8			
1955 spacing mean	75.3	73.1	73.5	73.3	72.8		73.6		
1956 spacing mean	76.7	77.9	81.5	73.7	73.5			76.7	
1957 spacing mean	78.6	82.4	85.9	86.2	82.9				83.2

	Rate .05	Mean .01	Spacing Mean .05 .01		Rate x Spacing .05 .01		C.V.
1955	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	8.3%
1956	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	11.9%
1957	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	4.3%
3 year mean	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	4.9%

* Analysis completed on transformed data

TABLE 14
HEIGHT ORCHARD GRASS SEEDLINGS 40 DAYS AFTER PLANTING

Rate of Seeding	Row Spacing					3 year rate mean	1955 rate mean	1956 rate mean	1957 rate mean
	7"	14"	21"	28"	35"				
2½	9.9	9.5	9.8	9.9	10.4	9.9	9.2	9.0	11.0
5	9.7	10.0	10.1	10.5	10.3	10.1	9.3	9.4	11.6
7½	10.1	10.1	10.4	10.1	10.0	10.1	9.7	9.5	11.1
10	9.9	10.7	9.7	9.6	9.9	10.0	9.3	9.3	11.3
12½	10.0	9.9	10.2	9.7	10.3	10.0	9.3	9.6	11.1
15	10.0	10.0	10.2	9.9	10.1	10.0	9.9	9.8	10.4
3 year spacing mean	9.9	10.0	10.1	9.9	10.2	10.0			
1955 spacing mean	9.9	9.3	9.4	9.2	9.4		9.4		
1956 spacing mean	9.2	9.6	9.5	9.6	9.5			9.5	
1957 spacing mean	10.7	11.2	11.3	10.9	11.3				11.1

	Rate	Mean	Spacing Mean		Rate x Spacing		C.V.
	.05	.01	.05	.01	.05	.01	
1955	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	13.0%
1956	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	9.0%
1957	0.63	0.83	N.S.	N.S.	N.S.	N.S.	9.0%
3 year mean	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	6.1%

TABLE 15

Variance Table Showing the F Values for the Isolation of the Linear and Quadratic Components of the Spacing for Mean Square - Orchard Grass.

	D.F.	Seed Yield	Culm Numbers	Weight 1000 Seeds	Establish- ment in Soil	Seedling Height
Spacings	4	3.47*	54.79**	3.66*	1.62	0.24
Linear	1	5.69*	209.51**	11.26**	0.01	0.35
Quadratic	1	5.03*	1.98	2.50	4.66	0.02
Dev. from reg.	2	1.58	3.84	0.44	0.80	0.30

TABLE 16

CORRELATION OF SOME YIELD PLANT CHARACTERISTICS - 3 YEAR MEANS

Seed Yield and Culm number	-	.285
Seed Yield and Weight seed per head	+	.912 *
1000 seed weight and seed yield	+	.444
1000 seed weight and culm number	-	.622
1000 seed weight and weight seed per panicle	-	.484 *
Culm number and weight seed per panicle	-	.787
Establishment and seed yield	+	.200
Establishment and weight seed per panicle	+	.436 *
Establishment and weight of 1000 seeds	+	.398
Establishment and culm number	+	.016
Seedling height and seed yield	+	.360
Seedling height and weight seed per head	+	.177 *
Seedling height and weight of 1000 seeds	+	.275
Seedling height and culm number	-	.117
Seedling height and germination	-	.933
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Significant values of r	.05	± .361
	.01	± .463
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* 1957 data only