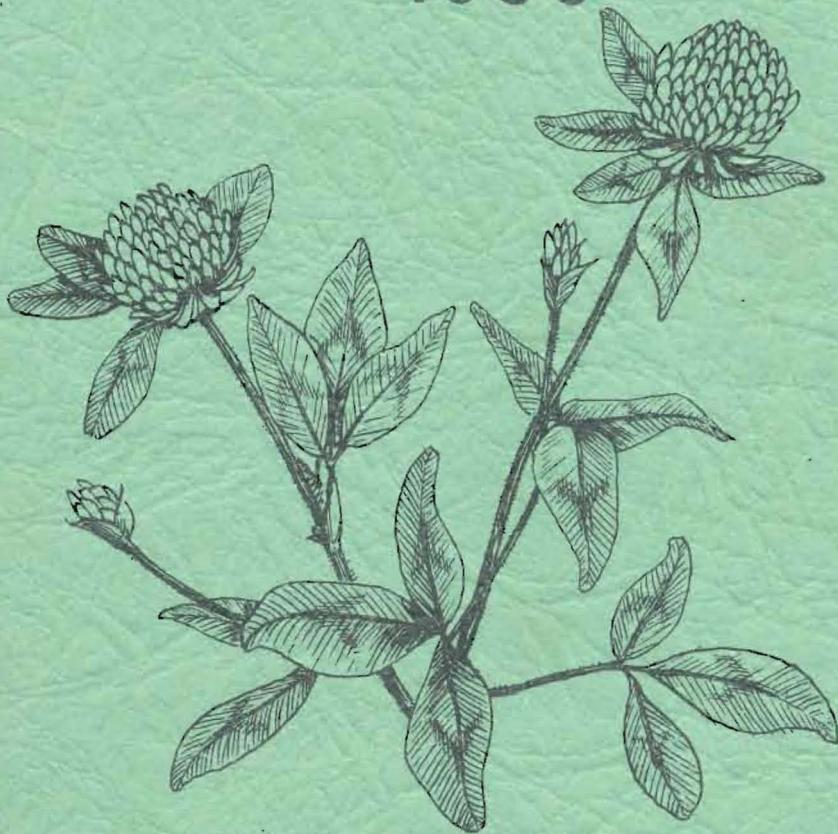


NOT FOR PUBLICATION

PROGRESS REPORT
FORAGE CROP
INVESTIGATIONS

HAY, PASTURE, SEED PRODUCTION SEEDLING ESTABLISHMENT

1955



Field Husbandry Department
Ontario Agricultural College
Guelph

CONTENTS

	<u>Page</u>
<u>HAY INVESTIGATIONS</u>	
1. Evaluation of species and mixtures for hay (1950) - -	1
2. Hay-pasture mixtures commonly grown in Ontario - - -	11
3. Mixture formulation trial 1954 - - - - - - - - - -	14
4. Miscellaneous hay projects - - - - - - - - - - - -	19
<u>PASTURE INVESTIGATIONS</u>	
5. Orchard vs. brome in a beef pasture - - - - - - - -	21
6. Long-term pastures commonly grown in Ontario - - - -	24
7. Rate of seeding ladino and orchard grass - - - - -	27
8. Birdsfoot trefoil in mixtures - - - - - - - - - - -	30
9. Species and mixtures for pasture under irrigation - -	31
10. Evaluation of species and mixtures for pasture (1950)	39
11. Rape and kale varieties - - - - - - - - - - - - - -	60
<u>SEED PRODUCTION</u>	
12. Ammonium nitrate on orchard grass - - - - - - - - -	62
13. Row spacing and rate of seeding in relation to seed production in orchard grass and timothy - - - - -	63
14. Alsike seed production - - - - - - - - - - - - - -	71
<u>SEEDLING ESTABLISHMENT</u>	
15. Rate of seeding and row spacing of an oat companion crop relative to forage seedling establishment - - -	73
16. Methods of seeding alfalfa and brome grass - - - -	76
17. Seedling establishment in alfalfa and red clover following seed treatment with fungicides - - - - -	80

Evaluation of Species and Mixtures for Hay 1950

R.P.O.: F.H. 12-1

Year Initiated: 1950

Objective:

1. Comparison of simple and complex mixtures.
2. Evaluation of 5 grasses grown alone and in association with legumes.
3. Evaluation of ladino clover alone and in association with alfalfa.
4. Evaluation of selected mixtures.

Procedure:

The species included and seeding rates used are listed in Table 1.

Table 1:- Hay Mixture Trial 1950. Rate of Seeding in Pounds per Acre of Each Component in the Different Associations.

Legume or Grass	Alf. or Lad. + Alone	1 grass	Alf. + Lad. + 1 grass	Alf. + Lad. + 2 grasses	Alf. + Lad. + 3 grasses	Alf. + Lad. + 4 grasses
Alfalfa	20	12	7	7	7	6
Ladino	6	4	2	2	2	2
Timothy	4	4	4	2	1.3	.5
Orchard	8	8	8	4	3	1
Brome	32	32	32	15	10	5
Meadow Fescue	19	19	19	9	6	3
Reed Canary	8	8	8	4	2.5	-

The seeding rate in the mixtures was set at 160-170 seeds per square foot with 60-70 of these being legume seeds. Species substitutions were based on a substitution of equal numbers of

seeds. For example, in the alfalfa - 1 grass group 63 seeds of alfalfa were seeded per square foot along with 100 seeds of the specific grass. Four pounds of timothy or 8 pounds of orchard grass supplied this number of seeds. The species seeded alone were seeded at the rate of 100 seeds per square foot.

The plots were 6' x 20' in size and were seeded broadcast in May, 1950. Four replications were used. An oat companion crop at $1\frac{1}{2}$ bushels per acre was removed when the oats were in the early dough stage. All associations were clipped on the same date at the hay stage and twice as aftermath pasture, the last harvest being not later than the first week in September.

The soil is well-drained, moderate in moisture holding capacity well suited for ladino. Establishment was excellent and moisture supplies were average in the 1951 and 1953 harvest years. Drought in 1952 lowered the general yield level and especially reduced the ladino growth.

Data on root production of selected associations are recorded in the 1954 Progress Report.

Table 2:- Hay Mixture Trial 1950. Mean Dry Matter Production in Tons per acre.

Association	* No.	Hay			Aftermath			Hay + Aftermath		
		1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.	1 yr.	2 yr.	3 yr.
Grasses	5	1.42	1.15	1.57	0.42	0.38	0.43	1.84	1.53	2.01
Alfalfa	1	2.11	2.21	2.30	1.98	1.71	0**	4.09	3.92	2.45**
Ladino	1	1.72	1.10	1.26	1.29	0.88	0.89	3.01	1.98	2.15
Alfalfa + 1 grass	5	2.50	2.42	2.61	1.70	1.61	1.66	4.20	4.03	4.27
Ladino + 1 grass	5	2.25	1.72	2.18	1.45	1.04	1.09	3.70	2.76	3.26
Alf. + Lad. + 1 grass	5	2.42	2.06	2.31	1.63	1.40	1.49	4.05	3.45	3.80
Alf. + Lad. + 2 grasses	10	2.62	2.26	2.51	1.65	1.40	1.50	4.27	3.66	4.01
Alf. + Lad. + 3 grasses	10	2.72	2.34	2.57	1.68	1.48	1.55	4.40	3.77	4.09
Alf. + Lad. + 4 grasses	1	2.97	2.48	2.75	1.65	1.32	1.38	4.63	3.80	4.13
Red Clover + Timothy	1	2.91	2.32	2.54	1.51	1.00	0.79	4.42	3.32	3.34
Ladino + Timothy	1	2.33	1.82	2.35	1.56	1.02	1.02	3.90	2.84	3.37
Alfalfa + Timothy	1	2.52	2.52	2.76	1.66	1.52	1.54	4.17	4.05	4.30
Alf. + R. Clover + Tim. + Brome	1	3.17	2.77	2.83	1.62	1.37	1.33	4.79	4.14	4.16
Alf. + Lad. + R.Clover+Tim+Brome	1	2.88	2.38	2.62	1.63	1.28	1.37	4.51	3.66	3.99
Alf. + Lad. + Tim. + Brome	1	2.96	2.49	2.74	1.71	1.52	1.65	4.67	4.01	4.39
Alf.+R.Clover+Tim.+Orch.+Brome	1	2.99	2.28	2.54	1.52	1.18	1.31	4.51	3.47	3.84
Alf.+Lad.+Tim.+Orch.+Brome	1	2.72	2.52	2.67	1.68	1.55	1.66	4.40	4.06	4.33

* number of associations averaged.

** bacterial wilt reduced stand severely so that aftermath not harvested in 1953.

Table 3:- Hay Mixture Trial 1950. Tons D.M. per Acre of Five Grasses Grown Alone and in Association with Legumes.

Grass	1 year (1951)		2 year mean		3 year mean	
	Alone	Leg.-grass Mixture *	Alone	Leg.-grass Mixture	Alone	Leg.-grass Mixture
Hay						
Timothy	1.80	2.50	1.50	2.21	2.10	2.54
Orchard	1.33	2.45	1.17	2.14	1.56	2.42
Brome	1.21	2.27	0.94	1.91	1.36	2.26
Meadow fescue	1.58	2.46	1.24	2.09	1.63	2.34
Reed Canary	1.17	2.29	0.88	1.99	1.22	2.28
July Aftermath						
Timothy	0.33	1.02	0.16	0.81	0.15	0.82
Orchard	0.48	1.04	0.24	0.83	0.33	0.86
Brome	0.49	1.00	0.24	0.84	0.31	0.89
Meadow fescue	0.32	0.99	0.16	0.81	0.21	0.88
Reed Canary	0.48	1.03	0.24	0.86	0.70	0.92
August Aftermath						
Timothy	0	0.60	0.22	0.52	0.21	0.54
Orchard	0	0.57	0.18	0.52	0.19	0.56
Brome	0	0.56	0.16	0.50	0.14	0.51
Meadow fescue	0	0.61	0.09	0.52	0.10	0.58
Reed Canary	0	0.54	0.21	0.51	0.18	0.49
Aftermath Total						
Timothy	0.33	1.63	0.39	1.33	0.35	1.36
Orchard	0.48	1.61	0.42	1.35	0.51	1.44
Brome	0.49	1.55	0.41	1.34	0.45	1.40
Meadow fescue	0.32	1.60	0.26	1.34	0.31	1.46
Reed Canary	0.48	1.58	0.45	1.37	0.55	1.41
Hay + Aftermath						
Timothy	2.13	4.12	1.89	3.54	2.45	3.90
Orchard	1.81	4.06	1.59	3.49	2.07	3.86
Brome	1.70	3.81	1.35	3.25	1.81	3.66
Meadow fescue	1.91	4.06	1.49	3.43	1.94	3.79
Reed Canary	1.65	3.86	1.33	3.36	1.77	3.68

* Average of 3 mixtures: alfalfa + grass, ladino + grass, alfalfa + ladino + grass.

Table 44 - Hay Mixture Test. Dry Matter Yields in Tons per Acre.

Association	Hay				Aftermath				Hay + Aftermath			
	1951	1952	1953	Mean	1951	1952	1953	Mean	1951	1952	1953	Mean
- Timothy	1.80	1.21	3.29	2.10	0.33	0.45	0.20	0.35	2.13	1.66	3.58	2.45
- Orchard	1.33	1.01	2.34	1.56	0.48	0.36	0.70	0.51	1.81	1.37	3.04	2.07
- Brome	1.21	0.66	2.20	1.36	0.49	0.33	0.53	0.45	1.70	1.00	2.73	1.61
Meadow Fescue	1.58	0.89	2.42	1.63	0.32	0.19	0.41	0.31	1.91	1.08	2.84	1.94
Reed Canary	1.17	0.60	1.89	1.22	0.48	0.42	0.75	0.55	1.65	1.02	2.64	1.77
- Alfalfa	2.11	2.31	2.46	2.30	1.98	1.44	--	--	4.09	3.76	--	2.45
- Ladino	1.72	0.48	1.58	1.26	1.29	0.48	0.89	0.89	3.01	0.96	2.47	2.15
- Alfalfa + Timothy	2.52	2.53	3.22	2.76	1.66	1.39	1.58	1.54	4.17	3.92	4.80	4.30
- " + Orchard	2.57	2.16	3.04	2.59	1.68	1.32	1.85	1.62	4.24	3.48	4.88	4.20
- " + Brome	2.48	2.08	2.90	2.49	1.62	1.51	1.76	1.63	4.09	3.59	4.66	4.12
- " + M. fescue	2.59	2.71	2.98	2.76	1.74	1.87	1.93	1.85	4.34	4.58	4.90	4.60
- " + R. canary	2.36	2.24	2.79	2.46	1.82	1.40	1.65	1.65	4.18	3.72	4.44	4.11
- Ladino + Timothy	2.33	1.31	3.41	2.35	1.56	0.48	1.02	1.02	3.90	1.78	4.43	3.37
- " + Orchard	2.27	1.43	2.91	2.20	1.50	0.83	1.41	1.25	3.77	2.66	4.32	3.45
- " + Brome	1.94	1.03	3.10	2.02	1.34	0.56	1.09	1.00	3.28	1.59	4.19	3.02
- " + M. fescue	2.50	1.13	2.88	2.17	1.52	0.46	1.32	1.10	4.02	1.59	4.20	3.27
- " + R. canary	2.22	1.10	3.19	2.17	1.33	0.78	1.17	1.09	3.55	1.88	4.36	3.26
- Alfalfa + Ladino + Timothy	2.64	1.92	2.96	2.51	1.66	1.24	1.68	1.53	4.29	3.16	4.64	4.03
- " + " + Orchard	2.51	1.89	3.04	2.46	1.66	1.11	1.61	1.46	4.17	3.00	4.66	3.94
- " + " + Brome	2.40	1.56	2.87	2.28	1.69	1.32	1.70	1.57	4.09	2.68	4.57	3.84
- " + " + M. fescue	2.28	1.34	2.62	2.08	1.54	0.91	1.82	1.42	3.82	2.25	4.44	3.51
- " + " + R. canary	2.28	1.76	2.57	2.20	1.58	1.24	1.62	1.48	3.86	2.99	4.19	3.68
- Alfalfa + Ladino + Timothy + Orchard	2.55	2.06	3.02	2.55	1.50	0.96	1.63	1.36	4.05	3.03	4.65	3.91
- " + " + " + Brome	2.96	2.01	3.25	2.74	1.71	1.34	1.89	1.65	4.67	3.35	5.14	4.39
- " + " + " + M. fescue	2.55	1.80	2.90	2.42	1.54	1.12	1.52	1.39	4.09	2.91	4.82	3.81
- " + " + " + R. canary	3.00	2.50	3.24	2.92	1.70	1.20	1.80	1.57	4.71	3.70	5.04	4.48
- " + " + Orchard + Brome	2.48	2.18	2.94	2.53	1.81	1.35	1.78	1.65	4.29	3.52	4.71	4.17
Alfalfa + Ladino + Orchard + M. fescue	2.79	2.03	3.07	2.63	1.89	1.26	1.67	1.61	4.68	3.32	4.74	4.24
" + " + " + R. canary	2.52	1.78	2.92	2.41	1.71	1.22	1.78	1.57	4.23	3.00	4.71	3.98
" " " Brome + M. fescue	2.27	1.32	2.98	2.19	1.48	0.96	1.69	1.38	3.75	2.28	4.68	3.57
" + " + " + R. canary	2.44	1.73	3.02	2.40	1.51	1.06	1.59	1.39	3.95	2.79	4.61	3.78
" + " + M. fescue + R. canary	2.62	1.51	2.86	2.91	1.63	1.06	1.65	1.45	4.25	2.57	4.51	3.78
Alfalfa + Ladino + Timothy + Orchard + Brome	2.72	2.31	2.98	2.67	1.68	1.42	1.68	1.66	4.40	3.72	4.86	4.33
" + " + " + " + M. fescue	3.02	2.09	3.20	2.77	1.77	1.34	1.76	1.62	4.60	3.44	4.96	4.40
" + " + " + " + R. canary	2.91	1.82	3.00	2.57	1.55	1.03	1.55	1.38	4.46	2.85	4.53	3.95
" + " + " + Brome + M. fescue	2.46	1.89	3.01	2.45	1.61	1.06	1.82	1.50	4.07	2.94	4.82	3.94
" + " + " + " + R. canary	2.61	1.96	3.08	2.55	1.72	1.37	1.77	1.62	4.33	3.33	4.85	4.17
Alfalfa + Ladino + Timothy + M. fescue + Canary	2.30	1.79	2.78	2.29	1.62	1.96	1.44	1.67	3.92	2.74	4.22	3.68
" + " + " + Orchard + Brome + M. fescue	2.72	2.04	3.09	2.62	1.78	0.98	1.70	1.49	4.50	3.02	4.79	4.10
" + " + " + " + R. canary	2.54	1.81	3.16	2.50	1.72	1.12	1.66	1.50	4.25	2.93	4.82	4.00
" + " + " + M. fescue + R. canary	3.25	2.25	3.19	2.90	1.68	1.28	1.76	1.57	4.93	3.53	4.95	4.47
" + " + Brome + M. fescue + R. canary	2.64	1.68	2.91	2.41	1.66	1.23	1.61	1.50	4.30	2.90	4.52	3.91
Alfalfa + Ladino + Timothy + Orchard + Brome + M. fescue	2.97	2.00	3.27	2.75	1.65	0.98	1.51	1.38	4.63	2.98	4.78	4.13
" + " + Red Clover + Timothy + Orchard + Brome	2.99	1.57	3.04	2.54	1.52	0.85	1.56	1.31	4.51	2.42	4.60	3.84
" + " + Ladino + Red Clover + Timothy + Brome	2.88	1.87	3.10	2.62	1.63	0.94	1.55	1.37	4.51	2.82	4.66	3.99
" + " + Red Clover + Timothy + Brome	3.17	2.36	2.95	2.83	1.62	1.12	1.25	1.33	4.79	3.48	4.20	4.16
Red Clover + Timothy	2.91	1.72	2.98	2.54	1.51	0.50	0.37	0.79	4.42	2.23	3.36	3.34
Mean	2.40	1.72	2.89	2.34	1.47	0.99	1.44		3.87	2.70	4.34	3.63
L.S.D. .05	0.49	0.59	0.40	0.32	0.29	0.43	0.40		0.63	0.95	0.52	0.53
C.V.	14.5	24.6	9.8	14.4	14.2	31.2	19.6		11.6	25.1	8.6	11.4

Table 51- Hay Mixture Trial. Aftermath Production in Tons D.M. per Acre.

Association	July						August						Aftermath Total					
	2 yr.			3 yr.			2 yr.			3 yr.			2 yr.			3 yr.		
	1951	1952	1953	Mean	1951	1952	1953	Mean	1951	1952	1953	Mean	1951	1952	1953	Mean	1951	1952
Timothy	.33	.00	.12	.16	.15	.00	.45	.17	.22	.21	.33	.45	.28	.39	.35			
Orchard	.48	.00	.50	.24	.33	.00	.36	.20	.18	.19	.48	.36	.70	.42	.51			
Brome	.49	.00	.44	.24	.31	.00	.33	.09	.16	.14	.49	.33	.53	.41	.45			
Meadow Fescue	.32	.00	.30	.16	.21	.00	.19	.11	.09	.10	.32	.19	.41	.26	.31			
Reed Canary	.48	.00	.63	.24	.37	.00	.42	.12	.21	.18	.48	.42	.75	.45	.55			
Alfalfa	1.27	.90	.00	1.08	.72	.72	.55	.00	.64	.42	1.98	1.44	.00	1.71	1.14			
Ladino	.92	.34	.60	.63	.62	.37	.14	.29	.26	.27	1.29	.48	.89	.88	.89			
Alfalfa + Timothy	1.02	.78	.98	.90	.93	.64	.61	.60	.62	.62	1.66	1.39	1.58	1.52	1.54			
" + Orchard	1.11	.77	1.20	.94	1.03	.56	.54	.65	.55	.58	1.68	1.32	1.85	1.50	1.62			
" + Brome	1.04	.91	1.16	.98	1.04	.58	.60	.60	.59	.59	1.62	1.51	1.76	1.56	1.63			
" + M. Fescue	1.00	1.07	1.18	1.03	1.08	.74	.79	.75	.76	.76	1.74	1.87	1.93	1.80	1.85			
" + R. Canary	1.16	.88	1.13	1.02	1.06	.66	.60	.52	.63	.59	1.82	1.48	1.65	1.65	1.65			
Ladino + Timothy	.98	.25	.58	.62	.60	.58	.22	.44	.40	.41	1.56	.48	1.02	1.02	1.02			
" + Orchard	.96	.44	.79	.70	.73	.54	.39	.62	.46	.52	1.50	.83	1.41	1.16	1.25			
" + Brome	.85	.42	.70	.64	.66	.49	.14	.39	.32	.34	1.34	.56	1.09	.95	1.00			
" + M. Fescue	.96	.29	.72	.62	.66	.56	.16	.59	.36	.44	1.52	.46	1.32	.99	1.10			
" + R. Canary	.92	.46	.82	.69	.73	.41	.32	.36	.36	.36	1.33	.78	1.17	1.06	1.09			
Alfalfa + Ladino + Timothy	1.07	.74	1.02	.90	.94	.58	.50	.66	.54	.58	1.66	1.24	1.68	1.45	1.53			
" + " + Orchard	1.06	.64	.95	.85	.88	.60	.47	.66	.54	.58	1.66	1.11	1.61	1.38	1.46			
" + " + Brome	1.07	.74	1.06	.90	.96	.62	.58	.64	.60	.61	1.69	1.32	1.70	1.50	1.57			
" + " + M. Fescue	1.01	.56	1.12	.78	.90	.53	.35	.70	.44	.53	1.54	.91	1.82	1.22	1.42			
" + " + R. Canary	1.02	.73	1.12	.88	.96	.56	.50	.50	.53	.52	1.58	1.24	1.62	1.41	1.48			
Alfalfa + Ladino + Timothy + Orchard	.97	.51	.96	.74	.81	.53	.45	.67	.49	.55	1.50	.96	1.63	1.23	1.36			
" + " + " + Brome	1.03	.81	1.11	.92	.98	.68	.52	.78	.60	.66	1.71	1.34	1.89	1.52	1.65			
" + " + " + M. Fescue	1.02	.67	.96	.84	.88	.52	.44	.56	.48	.51	1.54	1.12	1.52	1.33	1.39			
" + " + " + R. Canary	1.04	.64	1.04	.84	.91	.66	.56	.76	.61	.66	1.70	1.20	1.80	1.45	1.57			
" + " + " + Orchard + Brome	1.04	.80	1.04	.92	.96	.76	.55	.74	.66	.68	1.81	1.35	1.78	1.58	1.65			
Alfalfa + Ladino + Orchard + M. Fescue	1.14	.75	.93	.94	.94	.75	.53	.74	.64	.67	1.89	1.28	1.67	1.58	1.61			
" + " + " + R. Canary	1.09	.71	1.12	.90	.97	.62	.51	.66	.56	.60	1.71	1.22	1.78	1.46	1.57			
" + " + " + Brome + M. Fescue	1.01	.60	1.07	.80	.89	.47	.36	.62	.42	.48	1.48	.96	1.69	1.22	1.38			
" + " + " + R. Canary	.99	.65	.98	.82	.87	.52	.41	.61	.46	.51	1.51	1.06	1.59	1.28	1.39			
" + " + " + M. Fescue + R. Canary	1.12	.66	1.07	.89	.95	.50	.40	.58	.45	.49	1.63	1.06	1.65	1.34	1.45			
Alfalfa + Ladino + Timothy + Orchard + Brome	1.05	.78	1.09	.92	.97	.63	.63	.79	.63	.68	1.68	1.42	1.68	1.55	1.66			
" + " + " + " + M. Fescue	1.08	.78	1.04	.93	.97	.69	.56	.72	.62	.66	1.77	1.34	1.76	1.56	1.62			
" + " + " + " + R. Canary	1.03	.61	.96	.82	.87	.52	.42	.59	.47	.51	1.55	1.03	1.55	1.29	1.38			
" + " + " + Brome + M. Fescue	1.05	.66	1.14	.86	.95	.56	.40	.68	.48	.55	1.61	1.06	1.82	1.34	1.50			
" + " + " + " + R. Canary	1.03	.82	1.04	.92	.96	.68	.55	.73	.62	.65	1.72	1.37	1.77	1.54	1.62			
Alfalfa + Ladino + Timothy + M. Fescue + R. Canary	1.02	.57	.86	.80	.82	.60	.38	.57	.49	.52	1.62	1.96	1.44	1.29	1.67			
" + " + " + Orchard + Brome + M. Fescue	1.15	.57	1.04	.86	.92	.63	.42	.67	.52	.57	1.78	.98	1.70	1.38	1.49			
" + " + " + " + R. Canary	1.13	.67	1.02	.90	.94	.58	.45	.64	.52	.56	1.72	1.12	1.66	1.42	1.50			
" + " + " + M. Fescue + R. Canary	.95	.71	.98	.83	.88	.73	.56	.78	.64	.69	1.68	1.28	1.76	1.48	1.57			
" + " + " + Brome + M. Fescue + R. Canary	1.08	.70	1.02	.89	.93	.58	.52	.60	.55	.57	1.66	1.23	1.61	1.44	1.50			
Alfalfa + Ladino + Timothy + Orchard + Brome + M. Fescue	1.04	.58	.92	.81	.85	.61	.40	.60	.50	.54	1.65	.98	1.51	1.32	1.38			
" + " + " + R. Clover + Timothy + Orchard + Brome	1.08	.49	.94	.78	.84	.44	.36	.62	.40	.47	1.52	.85	1.56	1.18	1.31			
" + " + " + Ladino + R. Clover + Timothy + Brome	1.17	.51	.96	.84	.88	.46	.43	.59	.44	.49	1.63	.94	1.55	1.28	1.37			
" + " + " + R. Clover + Timothy + Brome	1.11	.67	.81	.89	.86	.50	.45	.44	.48	.46	1.62	1.12	1.25	1.37	1.33			
Red Clover + Timothy	1.11	.35	.22	.73	.56	.40	.15	.16	.28	.24	1.52	.50	.37	1.00	.79			
Kentucky Blue + White Dutch	.62	.25	.78	.44	.55	.36	.15	.44	.26	.31	.98	.40	1.22	.69	.87			
Mean	.96	.56	.89	.76	.83	.50	.43	.54	.47	.49	1.47	.99	1.44	1.23	1.30			
L.S.D. (0.05)											.29	.43	.40	.31	.30			
G.V.											14.2	31.2	19.6	15.7	14.8			

Table 6:- Legume Fraction of Several Associations at the Hay Stage in June. Two Year Average, 1952 and 1953.

Association	No.*	Percent			Tons D.M.	
		Alfalfa	Ladino	Alfalfa + Ladino	Total Alfalfa Legume	
Alfalfa + 1 grass	3	47.1		47.1	1.24	1.24
Ladino + 1 grass	3		13.2	13.2	0.30	-
Alf. + Lad. + 1 grass	3	29.8	13.0	42.8	1.02	0.70
Alf. + Lad. + 2 grasses	3	26.3	7.4	33.7	0.88	0.69
Alf. + Lad. + 3 grasses	3	20.4	8.0	28.4	-	-
Alf. + Lad. + 4 grasses	1	16.0	8.0	24.0	0.58	0.42

* number associations averaged.

Table 7:- Legume Fraction (% and D.M. Yields) of Selected Mixtures.
Two Year Average, 1952 and 1953 at the Hay Stage in June.

Association	Alfalfa	Ladino	Red Clover	Timothy	Orchard	Brome	Total Legume %	Yield tons/acre	
								Total Legume	Alf.
Alfalfa + Timothy	37						37	1.07	1.07
Alfalfa + Orchard	43						43	1.12	1.12
Alfalfa + Brome	62						62	1.54	1.54
Ladino + Timothy		12					12	0.28	
Ladino + Orchard		15					15	0.32	
Ladino + Brome		14					14	0.29	
Alf. + Lad. + Timothy	24	22					46	1.12	0.58
Alf. + Lad. + Orchard	25	10					35	0.86	0.62
Alf. + Lad. + Brome	41	8					49	1.09	0.91
Alf. + Lad. + Tim. + Orch.	18	4		14	65		22	0.56	0.46
+ Tim. + Brome	43	8		26		23	51	1.34	1.13
+ Orch. + Brome	19	10			64	8	29	0.74	0.49
Alf.+Lad.+Tim.+Orch.+Brome	27	10					37	0.98	0.71
Alf.+Lad.+Tim.+Orch.+Br.+M.Fes.	16	6					22	0.58	0.42
Alf.+Lad.+R.Clover+Tim.+Brome	23	3					31	0.77	0.57
Alf.+R.Clover+Tim.+Brome	32		8				30	0.80	0.85

Table 8:- Legume Fraction (% and D.M. yields) of Selected Mixtures at the Hay Stage in June 1953.

Association	Alfalfa	Ladino	R. Clover	Timothy	Orchard	Brome	M. Fescue	R. Canary	Yield tons/acre		
									Tot. Leg. %	Tot. Alf. Leg. %	
- Alfalfa + Timothy	32			68					32	1.03	1.03
- Alfalfa + Orchard	35				65				35	1.06	1.06
- Alfalfa + Brome	50					50			50	1.45	1.45
- Alfalfa + M. Fescue	50						50		50	1.49	1.49
- Alfalfa + R. Canary	48							52	48	1.34	1.34
- Ladino + Timothy		14		86					14	0.48	-
- Ladino + Orchard		12			88				12	0.35	-
- Ladino + Brome		15				95			15	0.16	-
- Ladino + M. Fescue		16					84		16	0.46	-
- Ladino + R. Canary		15						85	15	0.48	-
- Alf. + Lad. + Timothy	26	4		70					30	0.89	0.77
- Alf. + Lad. + Orchard	20	8			72				28	0.85	0.61
- Alf. + Lad. + Brome	33	3				64			36	1.03	0.95
- Alf. + Lad. + Tim. + Orch.	14	5			16	65			19	0.57	0.42
- Alf. + Lad. + Tim. + Brome	39	7			22	32			46	1.50	1.27
- Alf. + Lad. + Orch. + Brome	17	5				68	10		22	0.65	0.50
- Alf. + Lad. + Orch. + M.Fes.	15	3				80		2	18	0.55	0.46
- Alf. + Lad. + Orch. + R.Can.	29	6				65		0	35	1.02	0.85
- Alf. + Lad. + Brome + M.Fes.	26	3				58	13		29	0.86	0.77
- Alf. + Lad. + M.Fesc.+R.Can.	46	8				35	11	54	1.54	1.32	
- Alf. + Lad.+Tim.+Orch.+Br.	35	5		6	48	6			40	1.19	1.04
- Alf.+Lad.+M.Fes.+Orch.+Br.	24	2			63	8	3		26	0.80	0.74
- Alf.+Lad.+M.Fes.+Orch.+R.Can.	10	9			74		5	2	19	0.61	0.32
- Alf+Lad+Tim+Orch+Br.+M.Fes.	11	2		17	59	7	4		13	0.42	0.36
Alf+R.Clover+Tim+Orch+Brome	31		T	8	56	5			31	0.94	0.94
Alf+Lad+R.Clover+Tim+Brome	18	1	T	43	38				19	0.59	0.56
- Alf+R.Clover+Tim.+Brome	26		1	43	30				27	0.80	0.77

Table 9:- Contribution of Legume Component in 1953.

Association	Hay	Percent			Tons legume per acre				
		Aftermath			Hay	Aftermath			Hay + After.
		July	August	Mean		July	August	Tot.	
Alfalfa + Timothy	32	65	76	70	1.03	0.64	0.46	1.11	2.14
	+ Orchard	35	65	63	1.06	0.78	0.41	1.18	2.18
	+ Brome	50	63	74	1.45	0.73	0.44	1.21	2.66
	+ M. Fescue	50	86	88	1.49	1.01	0.66	1.68	3.17
	+ R. Canary	48	68	83	1.34	0.77	0.43	1.25	2.59
Mean		43	69	77	1.26	0.79	0.48	1.29	2.55
Ladino + Timothy	14	60	65	63	0.48	0.35	0.29	0.64	1.12
	+ Orchard	12	47	50	0.35	0.37	0.31	0.68	1.03
	+ Brome	5	34	56	0.16	0.24	0.22	0.49	0.65
	+ M. Fescue	16	67	67	0.46	0.48	0.40	0.88	1.34
	+ R. Canary	15	28	53	0.48	0.23	0.19	0.47	0.95
Mean		12	47	58	0.39	0.33	0.28	0.63	1.02

Evaluation of Hay-Pasture Mixtures Commonly Grown in Ontario

R.P.O.: F.H. 12-3

Year Initiated: 1954

Objective:

A number of hay-pasture mixtures, which have not been tested carefully, are being used and recommended in Ontario. It is essential that data be secured comparing these mixtures for dry matter production as hay, legume-grass balance and hay quality, and pasture production and seasonal distribution of pasture production in the final year (third) before the sod is ploughed.

Procedure:

The following 12 mixtures were seeded in a small plot (8' x 22') trial at Guelph in May, 1954. A randomized complete block design with four replicates was used.

Species	Composition in lbs. per acre of Mixture Number:											
	1	2	3	4	5	6	7	8	9	10	11	12
Alfalfa	5	4		6	4	6	5	5		5		6
R. Clover	5	5	9	4	3	4	3	1		4*	8	4
Ladino		1			1	1	1	2		1	2	
Alsike												
Birdsfoot Trefoil									5			
Timothy	2	2	5	2	5	2	3	5	5	8	8	5
Orchard	5	5	3	3	3	3	2					
Brome	5	5		5	5	5	5		5			
Meadow Fescue								3				
Reed Canary								4				

* late red clover

The management will be for hay and aftermath pasture for 2 years and for pasture in the third (last) year. This is the management system for which the mixtures were formulated. Aftermath pasture

dry matter yields will be obtained by clipping the mixture either once or twice, depending on crop growth. Four or five clippings will be made to determine dry matter production as pasture in the third year. The exact number will depend on crop growth in that particular year. Some botanical separations may be made to estimate the legume-grass balance, if this is considered necessary, during the coarse of the test.

Table 1:- Recommended Hay-Pasture Mixtures 1954. Tons D.M./Ac. in 1955.

Mixture No.	Hay June 23	Aftermath			Seasonal Total
		Aug. 8	Sept. 8	Total	
1	2.96	0.36	0.56	0.92	3.88
2	3.01	0.28	0.64	0.92	3.92
4	3.14	0.38	0.66	1.04	4.18
5	3.12	0.32	0.68	1.00	4.11
6	2.99	0.33	0.70	1.02	4.01
7	2.91	0.29	0.73	1.02	3.93
8	3.20	0.28	0.76	1.04	4.24
9	1.59	0.08	0.11	0.19	1.78
10	3.30	0.34	0.60	0.94	4.24
11	3.51	0.13	0.40	0.53	4.04
3	3.35	0.22	0.37	0.59	3.94
12	3.26	0.34	0.59	0.93	4.18
Mean	3.03	0.28	0.56	0.84	3.87
L.S.D. - 0.05	0.34				0.45
C.V.	7.8				8.2

Table 2:- Recommended Hay-Pasture Mixtures, 1954 - Botanical Separations, ~~1955~~.

Mixture No.	Alfalfa	R. Clover	Trefell	Ladino	Aldin	Total Legume	Timothy	Ochard	Brome
1954									
<u>Hay</u>									
3		45.0				45.0	27.6	27.4	
4	8.5	34.4				42.9	20.9	32.4	3.8
6	10.7	39.7		2.6		53.0	18.0	24.8	4.2
9			3.6			3.6	90.6		5.8
11		29.6			14.0	43.6	56.4		
12	11.6	35.3				46.9	53.1		
1955									
<u>Aftermath II</u>									
3		37.5				37.5	11.7	50.8	
4	55.4	16.8				72.2	6.0	18.5	3.3
6	45.4	13.8		8.2		57.4	6.4	22.0	4.2
9			41.4			41.4	46.5		12.1
11		30.9			9.1	40.0	60.0		
12	67.5	12.6				80.1	19.9		

Hay

4

6

9

10

Aftermath

4

6

9

12

Table 1:- Mixture Formulation Trial 1954. Yields of Mixtures in Tons of Dry Matter per Acre. 1955.

Mixture and rate of seeding* Lad. 1 + Tim. 3 + Brome 5 +	Hay June	Aft. Aug.	Aft. Sept.	Hay + Aft. Total
A. Alfalfa 6 +				
1. red clover 4	3.22	0.31	0.90	4.43
2. <u>red clover 4 +</u>				
Orchard grass 2	3.22	0.34	0.96	4.52
" " 4	3.13	0.45	0.92	4.50
" " 8	3.18	0.46	0.95	4.59
3. <u>red clover 2 +</u>				
Orchard grass 2	3.10	0.51	0.97	4.58
" " 4	3.10	0.51	0.99	4.60
" " 8	3.11	0.51	1.03	4.65
B. Alfalfa 8 +				
1. <u>red clover 4 +</u>				
Orchard grass 2	3.09	0.43	0.93	4.45
" " 4	3.32	0.49	0.93	4.74
" " 8	3.16	0.61	0.92	4.69
2. <u>red clover 2 +</u>				
Orchard grass 2	3.29	0.48	0.91	4.68
" " 4	3.23	0.61	1.02	4.86
" " 8	3.12	0.63	0.97	4.72
C. Alfalfa 10 +				
red clover 4 + orchard grass 2	3.10	0.46	0.90	4.46
Mean	3.17	0.49	0.95	4.60
L.S.D. - (0.05)	N.S.	N.S.	N.S.	N.S.
C.V.	6.2	32.9	12.3	6.6

* Lbs. per acre of seed germinating 85% or more.

Table 2:- Mixture Formulation Trial 1954. Yields of Legumes in Mixtures in Tons of Dry Matter per Acre. 1955.

Mixture and rate of seeding* Lad. 1 + Tim. 3 + Brome 5 +	Hay June	Aft. Aug.	Aft. Sept.	Hay + Aft. Total
A. <u>Alfalfa 6 +</u>				
1. <u>red clover 4 +</u>	1.37	0.24	0.66	2.27
2. <u>red clover 4 +</u>	1.46	0.22	0.52	2.20
Orchard grass 2				
" " 4	1.38	0.32	0.52	2.19
" " 8	1.53	0.31	0.62	2.46
3. <u>red clover 2 +</u>				
Orchard grass 2	1.13	0.40	0.63	2.16
" " 4	1.08	0.34	0.61	2.02
" " 8	1.10	0.33	0.66	2.09
B. <u>Alfalfa 8 +</u>				
1. <u>red clover 4 +</u>	1.34	0.29	0.57	2.21
Orchard grass 2				
" " 4	1.25	0.36	0.53	2.16
" " 8	1.30	0.42	0.54	2.25
2. <u>red clover 2 +</u>				
Orchard grass 2	1.28	0.36	0.61	2.25
" " 4	1.26	0.46	0.71	2.42
" " 8	1.46	0.46	0.67	2.58
C. <u>Alfalfa 10 +</u>				
<u>red clover 4 + orchard grass 2</u>	1.10	0.32	0.61	2.04
Mean	1.29	0.34	0.60	2.24
L.S.D. - (0.05)	0.27	N.S.	N.S.	N.S.
- (0.01)	0.37	N.S.	N.S.	N.S.
C.V.	14.9	42.2	1.5	12.1

* Lbs. per acre of seed germinating 85% or more.

Table 3:- Mixture Formulation Trial 1954. Botanical Composition I. Percent Legume in Mixtures.

Mixture and rate of seeding Lad. 1 + Tim. 3 + Brome 5 +	June hay				Aug. hay				Sept. aft.			
	Alf.	R.CI.	Lad.	Tot.	Alf.	R.CI.	Lad.	Tot.	Alf.	R.CI.	Lad.	Tot.
A. Alfalfa 6 +												
1. red clover 4	7	27	9	43	47	31	3	81	34	9	31	74
2. red clover 4 +												
orchard grass 2	5	32	8	45	31	23	5	59	25	8	23	56
" " 4	5	31	7	43	33	29	4	66	29	8	20	57
" " 8	6	35	8	49	32	25	7	64	38	6	22	66
3. red clover 2 +												
orchard grass 2	6	19	11	36	49	18	8	75	34	5	28	67
" " 4	9	14	11	34	44	11	11	66	30	5	26	61
" " 8	7	17	11	35	35	20	8	63	34	5	26	65
B. Alfalfa 8 +												
1. red clover 4 +												
orchard grass 2	6	26	12	44	34	28	5	67	34	7	23	64
" " 4	5	29	5	39	35	31	3	69	35	6	18	59
" " 8	6	27	8	41	29	30	8	67	29	8	23	60
2. red clover 2 +												
orchard grass 2	9	19	11	39	41	19	8	68	43	4	20	67
" " 4	7	24	8	39	46	20	9	75	40	5	25	70
" " 8	9	26	12	47	38	24	9	71	47	3	19	69
C. Alfalfa 10 +												
red clover 4 + orch. grass 2	6	21	8	35	37	25	7	69	42	7	21	70

* Lbs. per acre of seed germinating 85% or more.

Table 4:- Mixture Formulation Trial 1954. Botanical Composition II. Percent Grasses in Mixtures.

Mixture and rate of seeding *	June hay			Aug. Aft. Total	Sept. Aft.		
	Tim.	Orch.	Br.		Tim.	Orch.	Br.
Lad. 1 + Tim. 3 + Brome 5 +							
A. Alfalfa 6 +							
1. red clover 4	40	-	17	57	19	13	-
2. red clover 4 +							
orchard grass 2	18	30	7	55	41	4	33
" " 4	15	37	5	57	34	3	35
" " 8	12	36	3	51	36	2	29
3. red clover 2 +							
orchard grass 2	22	35	7	64	25	3	25
" " 4	22	38	6	66	36	3	30
" " 8	16	44	5	65	37	2	31
B. Alfalfa 8 +							
1. red clover 4 +							
orchard grass 2	22	28	6	56	33	3	28
" " 4	18	38	5	61	31	3	34
" " 8	15	41	3	59	33	2	35
2. red clover 2 +							
orchard grass 2	24	30	7	61	32	3	27
" " 4	18	37	6	61	25	2	25
" " 8	12	37	4	53	29	2	27
C. Alfalfa 10 +							
r. clover 4 + orch.grass 2	31	26	8	65	31	3	21

* Lbs. per acre of seed germinating 85% or more.

Table 5*- Number of Plants per Square Foot. 1955.

Mixture and rate of seeding*	July		Sept. #	
	Alfalfa	Red Clover	Alfalfa	Red Clover
A. Alfalfa 6 +				
1. red clover 4	2.58	2.62	2.21	1.62
2. <u>red clover 4 +</u>				
orchard grass 2	2.88	2.04	2.88	1.04
" " 4	3.21	2.58	3.00	1.54
" " 8	2.42	2.58	3.46	1.17
3. <u>red clover 2 +</u>				
orchard grass 2	3.25	1.79	3.17	0.67
B. Alfalfa 8 +				
1. <u>red clover 4 +</u>				
orchard grass 2	2.17	1.92	2.75	0.79
2. <u>red clover 2 +</u>				
orchard grass 2	3.38	1.33	3.33	0.46
C. Alfalfa 10 +				
<u>red clover 4 +</u>				
orchard grass 2	3.62	1.62	3.25	0.96
Mean	2.93	2.08	3.02	1.03
L.S.D. - (0.05)	N.S.	0.75	N.S.	0.70
- (0.01)	N.S.	1.02	N.S.	0.95
C.V.	24.1	24.5	26.5	45.7

* Lbs. per acre of seed germinating 85% or more
= following the June hay cut

following the Sept. aftermath cut

Table 1:- Bowmanville Hay-Pasture Mixtures 1954. Tons D.M. per Acre in 1955.

<u>Mixture</u>	<u>Hay June 22</u>	<u>Aftermath Sept. 13</u>	<u>Total</u>
1. Grimm (6) + Can. Red (4) + Com. Tim. (2) + Can. Orch. (3) + Can. Brome (5)	3.81	0.96	4.77
2. Vernal (6) + Lasalle (4) + Medon (2) + Oron (3) + Achenbach (5)	4.79	1.44	6.23
3. Can. red (9) + Medon (5) + Oron (3)	3.06	1.01	4.07
4. Can. red (9) + Medon (5)	3.35	0.81	4.16
5. Grimm (6) + Can. red (4) + Medon (2)	3.67	1.34	5.01
6. Grimm (6) + Ladino (1) + Can. Br. (8)	3.94	1.16	5.10
7. Ladino (2) + Oron (8)	2.21	1.08	3.29

Observation: These mixtures were seeded in single plots for demonstration purposes but the area was so uniform and growth so uniform that yields were taken. Brome was exceptionally vigorous and was the dominant species even to the point of reducing the vigor of the alfalfa.

Table 2:- Bowmanville Hay-Pasture Mixtures, 1954. Composition (%) of D.M.) in 1955.

<u>Mixture</u>	<u>No.</u>	<u>Alfalfa</u>	<u>R.Clover</u>	<u>Brome</u>	<u>Orchard</u>	<u>Timothy</u>	<u>Total Legume</u>
Hay - June 22							
1	5.7	6.2		55.1	3.5	29.5	11.9
2	5.0	2.5		76.9	11.3	4.3	7.4
3		4.0			40.5	55.5	4.0
4		9.4				90.6	9.4
5	33.1	4.4				62.5	37.5
6	9.4	0.3*		90.3			9.7
7					100.0		
Aftermath - Sept. 13							
1	35.2	1.8		44.0	16.7	1.8	
2	35.0	0		30.0	32.5	2.5	
3	-	1.8		-	92.6	5.6	
4	-	16.0		-	-	84.0	
5	62.4	-		1.8	-	35.8	
6	39.0	-		61.0	-	-	
7	-	-		-	100	-	

* Ladino

Puslinch Field (1)

Several mixtures were seeded in 1953 for silage research but could not be used for this purpose. Observations were made on all mixtures and botanical separations made on the general mixtures being recommended for well drained soils. The data are below.

	<u>lbs./ac.</u>	<u>% of D.M.</u>	<u>% C. Prot. of Component in 1955</u>
	<u>1954</u>	<u>1955</u>	
Alfalfa	6	2	10
Red Clover	4	16	4
Timothy	2	20	12
Orchard	3	56	60
Brome	5	7	14
			7.2
			6.8
			9.1

The legume fraction was extremely low and orchard grass was the dominant in both first and second harvest years.

Orchard vs. Brome in a Beef Pasture

R.P.O.: F.H. 13-2

Cooperative with Animal Husbandry

Objective:

To compare brome grass and orchard grass as a grass for use in pasture mixtures for beef cattle. The main considerations in this experiment are: (1) yield of forage and of beef per acre and (2) effect of the grass species on the survival of the legume.

Procedure:

The trial was seeded at the Arkell farm using 3 replicates each containing 2 three acre plots. The two mixtures are:

	<u>lbs./acre</u>		<u>lbs./acre</u>
Alfalfa	10	Alfalfa	10
Ladino	1.5	Ladino	1.5
White Dutch	1.5	White Dutch	1.5
Orchard	12	Brome	15

In 1956 seven steers averaging about 650 lbs. were placed in each plot on May 26 and kept there as long as there was pasture. The last group of steers was removed on July 5th. Growth ceased in early June because of drought and did not commence again until mid-August. The area was allowed to recover to strengthen the stand until late fall when it was grazed moderately. No record was made of pasture days or livestock gains during this late fall grazing.

Measures of growth and consumption were taken at intervals throughout the season using the cage-strip method. Ten cages were placed in each 3 acre block. At each harvest date samples were taken under each cage and 10 strips were cut in the grazed area. The cages were then moved to a new site on the grazed area.

Five samples from each plot at each harvest date were separated into their component species to determine the contribution of brome vs. orchard to the pasture yield and to study the effect of the grass on the legume.

Alfalfa stand counts were made (on August 19, to observe the competitive effect of the two grasses on alfalfa.)

Table 1:- Orchard vs. Brome in Beef Pasture. Growth and Consumption (tons D.M./ac.) in 1955.

Growth Period	Growth		Consumption	
	Brome	Orchard	Brome	Orchard
Up to May 25	1.18	0.95		
May 25 - June 14	0.31	0.20	0.65	0.41
June 14 - June 28	0.08	0.01	0.38	0.19
Total early season	1.57	1.16	1.03	0.60
June 28 - Sept. 12	0.64	0.73		
Sept. 12 - Oct. 19	0.07	0.23		
Total late season	0.71	0.96	N.M.*	N.M.*
Season Total	2.28	2.12		

* not measured

Table 2:- Orchard vs. Brome in Beef Pasture. Beef Yields and Pasture Days per Acre up to July 5.

	Lbs. Beef/Ac. May 26 - July 5	Pasture Days/Ac. May 26 - July 5
Brome	156	83
Orchard	122	84

Table 3:- Orchard vs. Brome in Beef Pasture. Contribution (%) of Each Species to Pasture and Alfalfa Plant Population. 1955.

	<u>%</u> <u>May 25</u>	<u>%</u> <u>Oct. 19</u>	<u>Alfalfa Plants</u> <u>per Sq. Ft. Aug. 19</u>	
<u>Brome Mixture</u>				
Alfalfa	37.5	20.1	11.3	3.5
Ladino	10.5	5.9		
Brome	41.9	74.0		
Weeds	10.1	0		
<u>Orchard Mixture</u>				
Alfalfa	29.5	4.0	7.0	1.4
Ladino	8.5	0.7		
Orchard	54.0	95.3		
Weeds	8.0	0		

Recommended Long-Term Pasture Mixtures, 1954

R.P.O.: F.H. 13 - 3

Objective: Compare several mixtures recommended in 1954 as long-term pasture mixtures.

Procedure: The following mixtures were seeded on range 10A.

Species	lbs./acre in Mixture Number							
	1	2	3	4	5	6	7	8
Alfalfa	3		6	4		3		5
Red Clover	5	5	3	1	1.5	1	2	2
Ladino	1	1	1	1	1.5	1	1	1
White Dutch			1	1	1.5	1	2	1
Alsike					3		2	1
Timothy			2	3	5	4	4	4
Orchard	5	5	4	4	3	3	2	
Brome	6	4	7	6	6	6	7	
M. Fescue	3	5	2	3	4	3	2	
Reed Canary		4		4	4		4	
Kentucky Bluegrass								3
Red Top								1
Red Fescue								4

Results: Dry matter yields were harvested from all plots in 1955.

Mixtures 3 and 4 were separated into the component species at each date. No further data will be obtained from this group of mixtures because this area has been released from experiment work.

Table 1:- Recommended Pasture Mixtures, 1954, Tons D.M. Per Acre

Mixture No.	May 16	June 7	July 12	Sept. 10	Seasonal Total
1	1.25	0.70	0.31	0.42	2.69
2	1.17	0.67	0.24	0.31	2.38
3	1.24	0.85	0.31	0.47	2.88
4	1.29	0.79	0.32	0.42	2.82
5	1.21	0.93	0.21	0.23	2.58
6	1.22	0.79	0.24	0.42	2.68
7	1.27	0.85	0.28	0.31	2.72
8	1.29	0.86	0.24	0.40	2.79
Mean	1.24	0.80	0.27	0.37	2.69
L.S.D. 0.05	N.S.				N.S.

Table 2:- Recommended Pasture Mixtures, 1954

Composition (%) of Mixtures

	Mixture 3				Mixture 4			
	May	June	July	Sept.	May	June	July	Sept.
Alfalfa	12.1	12.4	16.3	19.8	5.9	8.8	12.5	14.8
Red Clover					8.1	18.2	4.1	T
White Clover	20.0	33.6	32.4	11.3	26.4	12.6	27.3	12.0
Total Legume	32.1	46.0	48.7	31.1	40.4	39.6	43.9	26.8
Timothy	12.7	16.0	3.0	3.8	18.6	14.2	3.8	4.9
Orchard	44.4	33.1	43.4	59.4	35.5	41.0	47.1	63.4
Brome	8.2	2.8	3.1	3.8	2.4	3.1	2.8	2.8
Meadow Fescue	2.6	2.1	1.8	1.9	3.1	2.1	2.4	2.1

Rate of Seeding Ladino and Orchard Grass for Pasture

R.P.O.: F.H. 13-4

Year Initiated: 1954

Objective:

To estimate the optimum proportion of ladino to orchard in a long-term pasture and, to estimate the optimum rate of seeding the mixture.

Procedure:

Four rates of ladino ($\frac{1}{2}$, 1, 2 and 3 lbs./acre) and, 4 rates of orchard (3, 6, 9 and 12 lbs./acre) were seeded in all combinations in a split-plot design with ladino rates as the main plots.

Establishment was excellent in 1954. Ice sheet formation in the winter 1954-1955 destroyed part of two replicates so that two replicates only were harvested in 1955. The stand was excellent on these two replicates. No further data will be collected on this trial.

Table 1:- Ladino-Orchard Rates of Seeding. Tons D.M. per Acre,
1955.

Ladino Rate	Orchard Rate					Orchard Rate				
	3	6	9	12	Mean	3	6	9	12	Mean
	May 17*					June 10				
$\frac{1}{2}$	0.96	0.99	0.92	0.94	0.95	0.58	0.58	0.52	0.47	0.54
1	1.14	1.14	1.04	0.92	1.06	0.73	0.70	0.66	0.65	0.69
2	1.29	1.26	1.16	1.16	1.22	0.78	0.82	0.87	0.84	0.82
3	1.34	1.25	1.18	1.18	1.23	0.78	0.80	0.78	0.74	0.77
Mean	1.18	1.16	1.07	1.05	1.12	0.72	0.72	0.71	0.67	0.70
	July 12					August 30				
$\frac{1}{2}$	0.57	0.36	0.39	0.30	0.41	0.78	0.72	0.82	0.64	0.74
1	0.54	0.28	0.50	0.36	0.42	0.78	0.74	0.74	0.67	0.73
2	0.35	0.42	0.54	0.48	0.45	0.85	0.85	0.85	0.87	0.86
3	0.52	0.35	0.56	0.41	0.46	0.70	0.72	0.72	0.72	0.72
Mean	0.49	0.35	0.50	0.39	0.43	0.78	0.78	0.78	0.72	0.76
	Seasonal Total **									
$\frac{1}{2}$	2.88	2.64	2.64	2.36	2.63					
1	3.19	2.86	2.95	2.60	2.90					
2	3.26	3.34	3.42	3.34	3.34					
3	3.33	3.12	3.24	3.04	3.18					
Mean	3.17	2.99	3.06	2.83	3.01					

* L.S.D. Orchard - 5% level = 0.05 tons: - 1% level = 0.07;
C.V. = 4.4

Ladino - 5% level = 0.10 : - 1% level = 0.18;
interaction = N.S.

** L.S.D. - N.S.: C.V. 7.6

Table 2:- Ladino-Orchard Rates of Seeding. Percentage Ladino in Herbage, 1955.

Ladino Rate	Orchard Rate					Orchard Rate				
	3	6	9	12	Mean	3	6	9	12	Mean
	May 17					June 10				
$\frac{1}{2}$	22.0	31.3	17.6	15.2	21.3	54.8	48.9	46.1	44.1	48.5
1	33.8	39.6	31.9	34.2	34.9	60.2	60.4	54.1	56.8*	57.9
2	43.0	40.5	48.3	41.0	43.2	63.4	60.8	63.6	61.0	62.2
3	49.7	37.2	41.0	33.9	40.5	61.2	58.4	61.7	59.3*	60.2
Mean	36.7	37.2	34.2	30.6	34.6	59.9	57.1	56.4	54.4*	57.0
	July 12					August 30				
$\frac{1}{2}$	62.4	57.9	64.0	55.6	60.0	37.8	25.2	49.1	27.8	35.0
1	65.7	54.4	56.7	63.6	60.1	38.9	32.2	42.3	32.0	36.4
2	57.9	56.8	56.8	57.6	57.3	25.2	32.0	36.3	33.8	31.8
3	61.6	56.2	59.6	57.4	58.7	30.2	23.1	31.1	30.1	28.6
Mean	61.9	56.3	59.3	58.6	59.0	33.0	28.1	39.7	30.9	32.9

* one plot only

** mean 6 plots.

Table 1:- Birdsfoot Trefoil Mixtures 1954. D.M. in Tons/Acre and Legume Percentage in 1955

Mix. No.	Association	D.M. in Tons per Acre					% Birdsfoot Trefoil			Yield Trefoil Fraction, Sept.
		May 27	July 12	Sept. 7	Total		May	July	Sept.	
1	Empire + M. Fescue ✓	1.25	0.98	1.17	3.40	9.0	44.2	80.7		0.94
2	+ Can. Brome ✓	1.14	1.05	0.92	3.12	11.4	31.6	71.1		0.65
3	+ Orchard ✓	0.83	0.52	1.00	2.35	5.6	23.5	44.5		0.44
4	+ Medon Timothy ✓	1.19	0.97	1.09	3.25	5.8	29.6	77.6		0.84
5	+ T + O + B + F ✓	1.42	0.82	1.01	3.25	5.7	35.7	73.9		0.75
6	+ T + O + B	0.99	-	0.98	-	4.8	-	63.6		0.62
7	+ T + O + F	1.12	0.66	1.09	2.87	6.3	29.8	66.4		0.72
8	+ O + B + F	1.06	-	1.02	-	7.2	-	70.0		0.71
9	Alf. + Emp. + T + B + F	1.30	1.02	1.19	3.51	See Table 2				
10	Alf. + R.Clover + T + O + B	1.53	0.70	0.72	2.94	See Table 2				
Mean		1.18		1.02	3.24					
L.S.D. (0.05)		0.20			0.32					
C.V.		12.0			6.7					

Table 2:- Birdsfoot Trefoil Mixtures 1954. Legume Percentage in Mixtures 9 and 10.

	Mixture 9			Mixture 10	
	May	July	Sept.	July	Sept.
Alfalfa	4.4	13.2	44.0	7.6	18.0
Red Clover	9.3	0.3	-	28.4	25.2
Empire	4.4	19.5	35.9	-	-
Grass	81.9	67.0	20.1	64.0	56.8

Evaluation of Species and Mixtures of Legumes and Grasses
for Pasture under Irrigation

R.P.O.: F.H. 13-5

Cooperative project with Agricultural
Engineering

Objective:

1. Study of the effect of irrigation on pasture production considering dry matter yield, distribution of production throughout the growing season, and effect on survival and production of ladino clover.

2. Many pasture mixtures are in use in Ontario at present. Experimental work has shown that certain mixtures will respond more to applied fertilizers than others. This experiment was designed to determine whether there is a similar differential response of species or mixtures to applied water and, if so, to determine which mixture(s) are best suited for irrigated pastures.

The following comparisons will be made:

- (a) Response of a legume-grass mixture compared with response from an all grass mixture such as would be present in a pasture field after the legumes have gone out,
- (b) Response of ladino vs. white dutch clover to irrigation,
- (c) Comparison of response of orchard, brome and timothy,
- (d) Comparison of simple mixtures (1 legume: 1 grass) with complex mixtures (1-2 legumes; 3-4 grasses).

Procedure:

The eight mixtures, listed in Table 1, were seeded at Guelph in 1954. One set will be irrigated and one set not irrigated in subsequent years. The experimental design is a split-plot with

irrigated and non-irrigated as the main plots. Four replications were seeded. The plot size is 10' x 22' for the non-irrigated plots and 10' x 44' for the irrigated plots.

Table 1:- Mixtures seeded for Irrigation Trial

	lbs./acre of each Component in Mixture number:							
	1	2	3	4	5	6	7	8
Alfalfa							6	
Ladino	2	2	2	2	1	2	1	
W. Dutch					1		1	
Orchard	8			5	5	4	4	4
Brome			12	7	7	6	7	6
M. Fescue						3	2	3
Timothy				8				

An application of 1500 pounds of 2-12-16 analysis fertilizer was made on week prior to seeding. Fertilizer will be applied each year to maintain available fertility at a high level and remove fertility as a major limiting factor in this experiment.

The plots will be clipped 4-6 times during each growing season for dry matter yield determinations. The number of clips each year will vary with the growing conditions. Botanical separations of the herbage will be made to collect information on the effect of irrigation, species and mixture on the survival and production of the legume.

Two applications of water were made in 1954 to aid in establishing a uniform stand. The area was clipped twice for weed control. Establishment was excellent. Ladino growth was heavy in late fall so the area was clipped at a height of three inches on November 8, to remove some of the top growth and reduce the danger of smothering of the ladino during the winter.

An ice sheet introduced considerable variability in Replicate 1 so that that replicate was discarded. Water was applied by perforated pipe at 2" per application as follows:

<u>Date</u>	<u>Interval</u>
June 17	
June 19	12 days
July 15	16 "
July 22	7 "
July 28	6 "
Aug. 8	11 "

Results:

The data collected are listed in Tables 1, 2 and 3. The main features are:

1. Irrigation nearly doubled the yield of dry matter.
2. The bulk of the extra growth was produced in mid-and late summer when pasture supplies are often critical.
3. The severe moisture deficit reduce the stand and vigor of ladino.
4. The severe moisture deficit reduced the grass stand. Timothy was severely reduced (up to 90%), brome moderately (up to 30%) and orchard only slightly (Up to 10%).
5. This reduced stand and vigor is reflected in yield in the fall period when moisture was not limiting on the non-irrigated block.
6. Ladino was strong and vigorous in the irrigated section but still weak in the non-irrigated block at the time growth ceased in the fall.
7. Irrigation of an all-grass mixture (some volunteer clover) increased production by only 1.0 tons per acre while

irrigation of a ladino-grass mixture increased production by 2.2 tons per acre indicating more efficient use of irrigation water on a good mixture.

8. A ladino-grass mixture not irrigated outyielded in terms of D.M. per acre an all-grass mixture which was irrigated.

Table 1:- Pasture Irrigation Trial. Summary Seasonal Distribution of D.M., 1955.

	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>Total</u>
Not irrigated	2350	1450	180	0	680	200	4860
Irrigated	2350	1450	1080	1720	1440	960	9000

Table 2:- Pasture Irrigation Trial. Summary D.M. Increase Due to Legumes and to Irrigation.

<u>Not Irrigated</u>	<u>Total Yield 1955</u>	<u>July and August Yield</u>
Grass	1,700	80
Grass + ladino	5,500	200
<u>Irrigated</u>		
Grass	3,700	1,060
Grass + ladino	9,880	3,100

Table 3:- Pasture Irrigation Trial, 1954. D.H. in Tons per Acre. 1955

Mixture No.	Mixture	May	June	July	Aug.	Sept.	Oct.	Total		Increased by Irrigation
		17	9	7	5	1	20	Tons	Lbs.	
Irrigated										
3	Ladino + Medon Timothy	1.25	1.02	0.70	1.21	0.79	0.56	5.53	11,060	
1	Ladino + Orchard	1.35	0.76	0.50	0.88	0.75	0.52	4.76	9,520	
2	Ladino + Canadian Brome	1.27	0.86	0.63	1.21	0.72	0.54	5.05	10,100	
4	Ladino + Orchard + Brome	1.39	0.76	0.66	0.95	0.80	0.51	5.07	10,140	
6	Lad. + Orch. + Br. + M. Fesc.	1.32	0.77	0.52	0.93	0.83	0.59	4.94	9,880	
8	Orch. + Br. + M. Fesc.	0.68	0.31	0.29	0.24	0.24	0.10	1.86	3,720	
5	Lad. + W. Dutch + Orch. + Br.	1.40	0.79	0.55	0.90	0.83	0.50	4.97	9,940	
7	Alf. + Lad. + W.D. + T + O + B+M.F	1.33	0.75	0.48	0.54	0.81	0.56	4.48	8,960	
	Mean	1.25	0.75	0.54	0.86	0.72	0.48	4.58	9,160	
	L.S.D. - 0.05	0.08	0.11		0.41					
	C.V.	4.6	9.2		27.1					
Not Irrigated										
3	Ladino + Medon Timothy	1.14	0.82	0.06	0.0	0.20	0.15	2.36	4,720	3.17
1	Ladino + Orchard	1.20	0.75	0.12	-	0.42	0.10	2.59	5,180	2.17
2	Ladino + Can. Brome	1.08	0.81	0.04	-	0.92	0.09	2.34	4,680	2.71
4	Ladino + Orchard + Brome	1.15	0.74	0.11	-	0.42	0.08	2.50	5,000	2.57
6	Lad. + Orch. + Brome + M. Fesc.	1.25	0.84	0.10	-	0.42	0.14	2.75	5,500	2.19
8	Orch. + Brome + M. Fesc.	0.42	0.18	0.04	-	0.17	0.03	0.85	1,700	1.01
5	Lad. + W. Dutch. + Orch. + Br.	1.30	0.68	0.13	-	0.40	0.09	2.59	5,180	2.38
7	A + L + W.D. + T + O + B + M.F.	1.32	0.77	0.10	-	0.40	0.08	2.67	5,340	1.81
	Mean	1.10	0.70	0.09	-	0.34	0.10	2.33	4,660	2.25

Table 4:- Pasture Irrigation Trial 1954. Analysis of Variance Data on D.M. Yields.

Variation due to	df	July	Sept.	Season Total
Water Levels	1	2.4707**	1.7176*	60.88**
Replications	2	0.0126	0.0343	0.75
Error	2	0.0014	0.0386	0.12
Mixtures	7	0.0280	0.1176**	4.40**
Water level x Mix.7		0.0260	0.0315*	0.62**
Error	26	0.0124	0.0072	0.12
L.S.D. - 0.05				
Mixtures			0.10	0.41
Water level			0.14	0.57
C.V.		35.9	16.0	10.0

Table 5:- Pasture Irrigation Trial 1954. Botanical Separations (%) on Irrigated Section, 1955*.

Mixture No.	Alf.	W. Cl.	Tim.	Orch.	Br.	M.Fesc.	Alf.	W. Cl.	Tim.	Orch.	Br.	M.Fesc.
May 17						June 9						
3	57.2	42.8					72.8	27.2				
1	35.3		64.7				61.6		38.4			
2	51.4			48.6			68.4		31.6			
4	46.8			40.8	12.4		67.8		27.4	4.8		
6	50.2			21.3	7.1	21.4	67.9		16.2	3.2	12.7	
8	9.9			36.9	15.6	37.4	18.6		24.8	19.2	37.4	
5	41.3			46.5	12.2		65.4		27.9	6.7		
7	8.2	36.3	5.9	24.3	9.6	15.2	6.6	57.3	4.8	18.8	3.1	9.4
July 7						Aug. 5						
3	75.9	24.1					84.2	15.8				
1	55.5		44.5				56.4		43.6			
2	68.9			31.1			70.0		30.0			- 37 -
4	52.8			42.0	5.2		60.6		28.8	10.6		
6	65.7			22.5	2.4	9.4	66.9		22.1	4.8	6.2	
8	36.4			43.6	4.5	15.5	24.4		42.3	11.1	22.2	
5	59.3			37.9	2.8		52.7		38.2	9.1		
7	6.6	54.8		26.8	3.8	8.0	10.4	54.9	22.0	6.9	5.8	
September 1												
3	80.9	19.1										
1	59.2		40.8									
2	67.8			32.2								
4	58.3			34.5	7.2							
6	68.8			20.6	5.0	5.6						
8	grasses not separated											
5	54.4			36.9	8.7							
7	3.1	46.9	3.1	16.9	2.3	3.1						

* October 19 herbage not separated. Cut after killing frost, did not keep in storage.

Table 6:- Pasture Irrigation Trial 1954. Botanical Separations (%)
on Non-Irrigated Section, September 1955.

Mixture No.	Alf.	W. Cl.	Tim.	Orch.	Brome	M. Fesc.
3		70.7	29.3*			
1		14.8		85.2		
2		37.3			62.7	
4		16.3		77.2		6.5
6		22.8		64.0	5.7	7.4
8		grasses not separated				
5		12.8		80.1	7.1	
7	4.9	4.9	4.4	31.5	2.5	2.5

* grass severely killed by drought.

Table 1:- Pasture Trial 1950. Comparison of Selected Groups of Mixtures. Tons D.M.
per Acre.

Association	Number Assoc. in Mean	Seasonal Total			2 Year Mean 1951-1952	3 Year Mean 1951-1953	Seasonal Dist. of Prod. 2 Year Mean			
		1951	1952	1953			May	June	July	August
Kentucky Bluegrass	1	0.48	0.69	1.82	0.58	1.00	0.24	0.16	0.13	0.06
Grasses	5	0.94	1.02	-	0.98	-	0.32	0.25	0.30	0.12
Alfalfa	1	2.06	2.29	0	2.18	1.45	0.94	0.57	0.56	0.20
Ladino	1	2.67	1.01	2.56	1.84	2.08	0.60	0.40	0.42	0.41
Alfalfa + 1 Grass	5	2.11	2.09	2.87	2.10	2.36	0.96	0.30	0.47	0.36
Ladino + 1 Grass	5	2.98	1.51	3.44	2.24	2.64	0.90	0.42	0.52	0.40
Alf. + Lad. + 1 Grass	5	2.87	1.96	3.44	2.42	2.76				
+ 2 Grasses	10	2.93	1.96	3.45	2.44	2.78	0.98	0.36	0.60	0.47
+ 3 Grasses	10	3.02	1.99	3.48	2.50	2.83	1.02	0.37	0.58	0.46
+ 4 Grasses	1	3.05	2.06	3.48	2.56	2.86	1.11	0.41	0.58	0.45
Red Clover + Timothy	1	2.96	1.26	1.94	2.11	2.05	0.92	0.26	0.60	0.34

39

Table 2:- Pasture Trial 1950. Comparison of Five Grasses Grown Alone and in Association with Alfalfa and Ladino. Tons D.M. per Acre.

Grass	Seasonal Total		Seasonal Distribution With Legumes 2 yr. mean	Seasonal Distribution With Legumes 2 yr. mean
	Alone	With Legumes		
	3 Year Mean		May	May
Timothy	1.37	2.72	1.01	1.03
Orchard	1.46	2.62	1.02	1.04
Brome	-	2.48	0.89	0.94
Meadow Fescue	-	2.57	0.94	0.97
Reed Canary	-	2.53	0.88	0.94
	2 Year Mean		June	June
Timothy	1.07	2.34	0.35	0.57
Orchard	1.12	2.32	0.32	0.47
Brome	0.90	2.18	0.37	0.42
Meadow Fescue	0.87	2.22	0.38	0.54
Reed Canary	0.96	2.20	0.38	0.46
	1951		July	July
Timothy	1.08	2.75	0.58	0.67
Orchard	1.16	2.63	0.56	0.74
Brome	0.82	2.66	0.53	0.74
Meadow Fescue	0.83	2.64	0.48	0.65
Reed Canary	0.84	2.57	0.49	0.78
	1952		August	August
Timothy	1.06	1.94	0.40	0.50
Orchard	1.07	2.01	0.41	0.52
Brome	0.97	1.70	0.39	0.47
Meadow Fescue	0.91	1.80	0.41	0.52
Reed Canary	1.07	1.83	0.45	0.52
	1953			
Timothy	1.82	3.48		
Orchard	1.98	3.23		
Brome	2.14	3.08		
Meadow Fescue	-	3.28		
Reed Canary	-	3.18		

Table 3: Pasture Trial 1950. Summary of D.M. Production in Tons per Acre.

Association	Seasonal Total			2 Yr. Mean 1951-1952	3 Yr. Mean 1951-1953	Seasonal Distribution of Production 2 Yr. Mean 1951-1952			
	1951	1952	1951			May	June	July	
						August			
Kentucky Bluegrass	0.48	0.69	1.02	0.58	1.00	0.24	0.16	0.13	0.36
Timothy	1.08*	1.06	1.98	1.07	1.37	0.31	0.35	0.30	0.15
Oreohard	1.16	1.07	2.14	1.12	1.46	0.41	0.22	0.33	0.16
Brome	0.82	0.97	-	0.90	-	0.29	0.20	0.29	0.12
Meadow Fescue	0.83	0.91	-	0.87	-	0.32	0.22	0.24	0.08
Reed Canary	0.84	1.07	-	0.96	-	0.26	0.27	0.32	0.08
Alfalfa	2.06	2.29	-	2.18	1.45	0.94	0.47	0.56	0.20
Ladino	2.67	1.01	2.56	1.84	2.08	0.60	0.40	0.42	0.41
Alfalfa + Timothy	2.44	2.26	3.17	2.35	2.62	1.02	0.24	0.72	0.38
" + Oreohard	2.07	2.06	2.82	2.06	2.32	1.02	0.22	0.48	0.36
" + Brome	2.08	2.00	2.84	2.04	2.31	0.88	0.43	0.39	0.34
" + M. Fescue	1.86	2.28	2.90	2.07	3.31	1.02	0.22	0.44	0.38
" + R. Canary	2.09	1.87	2.63	1.98	2.82	0.86	0.34	0.94	0.38
Ladino + Timothy	2.87	1.41	3.63	2.14	2.64	0.93	0.40	0.42	0.38
" + Oreohard	3.07	1.90	3.43	2.48	2.80	1.02	0.41	0.62	0.44
" + Brome	3.01	1.10	3.22	2.06	2.44	0.82	0.38	0.51	0.34
" + M. Fescue	3.19	1.61	3.56	2.40	2.79	0.91	0.52	0.52	0.44
" + R. Canary	2.75	1.54	3.34	2.14	2.54	0.80	0.40	0.50	0.44
Alfalfa + Ladino + Timothy	2.94	2.14	3.64	2.54	2.91	1.09	0.41	0.59	0.46
" + " + Oreohard	2.75	2.08	3.44	2.42	2.77	1.04	0.35	0.58	0.45
" + " + Brome	2.88	2.01	3.19	2.44	2.69	0.96	0.30	0.70	0.50
" + " + M. Fescue	2.88	1.50	3.38	2.19	2.59	0.91	0.40	0.47	0.41
" + " + R. Canary	2.88	2.08	3.56	2.48	2.84	0.94	0.36	0.64	0.54
Alfalfa + Ladino + Timothy + Orchard	2.76	2.01	3.29	2.38	2.69	1.00	0.36	0.60	0.43
" + " + " + " + Brome	3.26	2.09	3.68	2.68	3.01	1.19	0.36	0.64	0.48
" + " + " + " + M. Fescue	2.83	1.54	3.54	2.18	2.64	0.94	0.36	0.45	0.43
" + " + " + " + R. Canary	3.08	2.63	3.81	2.86	3.17	1.09	0.45	0.76	0.56
" + " + " + Orchard + Brome	3.09	2.50	3.55	2.80	3.05	1.20	0.39	0.71	0.50
Alfalfa + Ladino + Orchard + M. Fescue	3.08	2.17	3.56	2.62	2.94	1.06	0.40	0.60	0.50
" + " + " + " + R. Canary	2.88	1.88	3.48	2.38	2.75	1.00	0.45	0.58	0.44
" + " + " + Brome + M. Fescue	2.83	1.56	3.27	2.20	2.55	0.94	0.45	0.52	0.38
" + " + " + " + R. Canary	2.97	1.74	3.08	2.36	2.60	0.93	0.34	0.58	0.42
" + " + " + M. Fescue + R. Canary	2.66	1.43	3.23	2.04	2.44	0.88	0.36	0.42	0.40
Alfalfa + Ladino + Timothy + Orchard + Brome	3.08	2.26	3.61	2.67	2.98	1.14	0.36	0.67	0.50
" + " + " + " + M. Fescue	3.18	2.34	3.64	2.76	3.05	1.18	0.42	0.62	0.54
" + " + " + " + R. Canary	2.77	1.62	3.22	2.20	2.54	1.00	0.31	0.50	0.38
" + " + " + Brome + M. Fescue	2.90	1.72	3.42	2.31	2.68	1.00	0.40	0.50	0.40
" + " + " + " + R. Canary	3.14	2.24	3.63	3.19	3.34	1.06	0.41	0.69	0.53
Alfalfa + Ladino + Timothy + M. Fescue + R. Canary	3.02	2.02	3.54	2.52	2.86	1.05	0.42	0.57	0.47
" + " + " + Orchard + Brome + M. Fescue	3.08	1.90	3.31	2.49	2.76	1.10	0.37	0.58	0.42
" + " + " + " + R. Canary	2.81	1.51	3.38	2.16	2.57	0.97	0.33	0.49	0.38
" + " + " + M. Fescue + R. Canary	3.28	2.55	3.73	2.92	3.19	1.18	0.42	0.73	0.57
" + " + " + Brome + M. Fescue + R. Canary	2.91	1.74	3.34	2.32	2.66	1.01	0.36	0.53	0.42
Alfalfa + Ladino + Timothy + Orchard + Brome + M. Fescue	3.05	2.06	3.48	2.56	2.86	1.11	0.41	0.57	0.45
" + Red Clover + Timothy + Orchard + Brome	2.52	1.34	2.26	1.93	2.04	0.92	0.18	0.50	0.33
" + Ladino + R. Clover + Timothy + Brome	2.98	1.52	3.32	2.25	2.61	1.04	0.30	0.58	0.34
" + Red Clover + Timothy + Brome	2.91	1.85	2.48	2.38	2.41	1.08	0.23	0.70	0.36
Red Clover + Timothy	2.96	1.26	1.94	2.11	2.05	0.92	0.26	0.59	0.34
Kentucky Blue + White Dutch	2.08	1.48	3.52	1.78	2.36	0.78	0.41	0.38	0.20
Mean	2.59	1.77	3.25	2.18	2.62				
L.S.D.-0.05	0.44	0.68	0.44	0.51	0.44				
-0.01	0.58	0.90	0.58	0.67	0.58				
C.V.	12.2	28.0	9.7	13.0	10.8				

* Mean of reps. 1 and 2.

Table 4:- Pasture Trial 1950. Distribution of D.M. Production in Tons per Acre.

Association	1951				1952				1953			
	May	June	July	August	May	June	July	August	May	June	July	August
Kentucky Bluegrass	0.12	0.20	0.16	-	0.35	0.13	0.10	0.11	0.50	0.46	0.86	0.00
Timothy	-	-	-	-	0.28	0.40	0.21	0.16	0.52	0.36	0.23	0.04
Oreohard	0.44	0.18	0.36	0.19	0.36	0.25	0.30	0.14	0.90	0.44	0.56	0.85
Brome	0.38	0.12	0.38	-	0.20	0.28	0.26	0.24	-	-	-	-
Meadow Fescue	0.32	0.16	0.32	-	0.32	0.26	0.17	0.16	-	-	-	-
Red Canary	0.34	0.29	0.21	-	0.23	0.25	0.42	0.17	0.52	0.43	0.54	-
Alfalfa	0.91	0.64	0.51	-	0.98	0.30	0.60	0.40	-	-	-	-
Ladino	0.93	0.58	0.58	0.64	0.27	0.29	0.26	0.18	0.56	0.34	0.84	0.38
Alfalfa + Timothy	1.03	0.22	0.50	0.40	1.08	0.25	0.63	0.35	3.42	3.37	3.83	2.46
" + Oreohard	0.96	0.19	0.53	0.38	1.07	0.34	0.48	0.33	3.83	2.98	2.88	2.18
" + Brome	0.91	0.38	0.81	0.38	0.86	0.28	0.57	0.30	0.99	0.46	0.93	0.46
" + M. Fescue	0.59	0.19	0.42	0.37	1.14	0.26	0.47	0.40	1.10	0.48	0.75	0.50
" + R. Canary	0.90	0.58	0.53	0.38	0.86	0.19	0.45	0.37	2.68	2.70	2.44	2.42
Ladino + Timothy	1.12	0.49	0.42	0.64	0.74	0.38	0.28	0.18	1.07	0.94	0.96	0.66
" + Oreohard	1.15	0.48	0.58	0.62	0.70	0.34	0.41	0.25	1.00	0.66	1.03	0.73
" + Brome	1.10	0.42	0.86	0.63	0.55	0.35	0.16	0.05	0.95	0.64	1.03	0.56
" + M. Fescue	1.16	0.36	0.75	0.72	0.66	0.49	0.30	0.16	1.09	0.71	1.00	0.76
" + R. Canary	1.00	0.44	0.66	0.63	0.61	0.35	0.33	0.25	1.06	0.66	1.02	0.60
Alfalfa + Ladino + Timothy	1.13	0.41	0.74	0.66	1.03	0.43	0.44	0.26	1.08	0.86	1.04	0.66
" + " + " + Orchard	1.06	0.35	0.74	0.60	1.01	0.35	0.48	0.30	1.15	0.64	1.01	0.64
" + " + " + Brome	1.11	0.26	0.84	0.68	0.81	0.33	0.56	0.31	1.06	0.55	0.96	0.61
" + " + " + M. Fescue	1.08	0.42	0.72	0.66	0.74	0.38	0.22	0.16	1.10	0.70	0.93	0.64
" + " + " + R. Canary	1.03	0.36	0.80	0.68	0.85	0.37	0.47	0.39	1.07	0.57	1.37	0.56
Alfalfa + Ladino + Timothy + Orchard	1.06	0.40	0.72	0.58	0.95	0.38	0.47	0.28	0.99	0.46	0.98	0.74
" + " + " + " + Brome	1.15	0.33	0.80	0.68	0.93	0.38	0.48	0.29	1.26	0.70	1.05	0.67
" + " + " + " + M. Fescue	1.07	0.39	0.69	0.68	0.80	0.34	0.61	0.18	1.10	0.68	1.00	0.68
" + " + " + " + R. Canary	1.09	0.38	0.68	0.73	1.09	0.58	0.64	0.39	1.12	0.94	1.01	0.74
" + " + " + Orchard + Brome	1.22	0.36	0.87	0.64	1.17	0.42	0.55	0.37	1.14	0.68	0.96	0.76
Alfalfa + Ladino + Orchard + M. Fescue	1.18	0.38	0.79	0.79	1.01	0.43	0.48	0.31	1.24	0.66	1.00	0.76
" + " + " + " + R. Canary	1.03	0.35	0.84	0.65	0.96	0.35	0.33	0.24	1.10	0.64	1.02	0.72
" + " + " + Brome + M. Fescue	1.10	0.38	0.74	0.60	0.77	0.32	0.31	0.16	1.21	0.57	0.97	0.62
" + " + " + " + R. Canary	1.11	0.35	0.74	0.59	0.75	0.34	0.41	0.24	1.04	0.53	0.98	0.52
" + " + " + M. Fescue + R. Canary	1.06	0.35	0.63	0.62	0.70	0.36	0.21	0.17	1.10	0.70	0.98	0.46
Alfalfa + Ladino + Timothy + Orchard + Brome	1.18	0.39	0.85	0.66	1.11	0.33	0.48	0.34	1.13	0.70	1.05	0.73
" + " + " + " + M. Fescue	1.22	0.39	0.81	0.75	1.14	0.44	0.48	0.34	1.14	0.66	1.09	0.78
" + " + " + " + R. Canary	1.10	0.36	0.76	0.55	0.91	0.28	0.33	0.21	1.08	0.59	0.95	0.60
" + " + " + Brome + M. Fescue	1.10	0.38	0.78	0.64	0.90	0.43	0.23	0.16	1.10	0.68	1.00	0.59
" + " + " + " + R. Canary	1.14	0.36	0.88	0.75	0.98	0.46	0.50	0.31	1.11	0.71	1.07	0.74
Alfalfa + Ladino + Timothy + M. Fescue + R. Canary	1.21	0.38	0.77	0.67	0.90	0.47	0.38	0.27	1.09	0.79	0.98	0.68
" + " + " + " + " + Brome + M. Fescue	1.25	0.38	0.80	0.64	0.96	0.37	0.37	0.31	1.06	0.64	0.96	0.68
" + " + " + " + R. Canary	1.25	0.35	0.73	0.59	0.78	0.31	0.25	0.17	1.05	0.66	1.01	0.66
" + " + " + M. Fescue + R. Canary	1.27	0.38	0.84	0.79	1.09	0.47	0.62	0.36	1.17	0.74	1.04	0.78
" + " + " + Brome + M. Fescue + R. Canary	1.28	0.39	0.73	0.61	0.84	0.33	0.34	0.22	1.23	0.64	1.00	0.57
Alfalfa + Ladino + Timothy + Orchard + Brome + M. Fescue	1.19	0.44	0.79	0.66	1.07	0.38	0.36	0.24	1.08	0.70	1.01	0.69
" + Red Clover + Timothy + Orchard + Brome	1.14	0.28	0.72	0.47	0.71	0.26	0.28	0.19	0.79	0.61	0.66	0.49
" + Ladino + Red Clover + Timothy + Brome	1.06	0.26	0.92	0.55	0.88	0.34	0.24	0.18	0.95	0.61	0.97	0.59
" + Red Clover + Timothy + Brome	1.07	0.18	0.98	0.48	0.99	0.48	0.48	0.25	0.85	0.49	0.69	0.45
Red Clover + Timothy	1.03	0.23	0.93	0.59	0.68	0.28	0.26	0.10	1.02	0.69	0.49	1.36

Table 5: Pasture Trial 1950. Comparison of Alfalfa, Red Clover and Ladino. Tons
D.M. per Acre.

Association	Seasonal Total			2 Yr. Mean 1951-1952	3 Yr. Mean 1951-1953	Seasonal Dist. of Prod. 3 Year Mean			
	1951	1952	1953			May	June	July	August
Red Clover + Timothy	2.96	1.26	1.94	2.11	2.05	1.22	0.87	1.23	0.68
Ladino + Timothy	2.87	1.41	3.63	2.14	2.64	0.90	0.58	0.60	0.47
Alfalfa + Timothy	2.44	2.26	3.17	2.35	2.62	1.02	0.49	0.77	0.45
Alf.+R.Clover+Tim.+Brome	2.91	1.85	2.48	2.38	2.41	1.01	0.32	0.70	0.39
Alf.+Lad.+R.Clover+Tim.+Br.	2.98	1.52	3.32	2.25	2.61	1.01	0.47	0.71	0.42
Alf.+Lad.+Tim.+Brome	3.26	2.09	3.68	2.68	3.01	1.21	0.47	0.78	0.55
Alf.+R.Clover+Tim.+Orch.+Br.	2.52	1.34	2.26	1.93	2.04	0.88	0.26	0.55	0.35
Alf.+Ladino+Tim.+Orch.+Br.	3.08	2.26	3.61	2.67	2.98	1.14	0.47	0.79	0.58

Table 6:- Pasture Trial 1950. Percentage of Alfalfa and Ladino in Selected Associations in May.

Association	No.*	1952			1953			2 yr. ave.		
		Alf.	Lad.	Tot.	Alf.	Lad.	Tot.	Alf.	Lad.	Tot.
Alfalfa + 1 grass	3	64		64	39		39	52		52
Ladino + 1 grass	3		39	39		24	24	32		32
Alf. + Lad. + 1 grass	3	29	21	50	14	20	34	21	20	41
Alf. + Lad. + 2 grasses	3	24	20	44	9	18	27	17	19	35
Alf. + Lad. + 3 grasses	3	13	23	36	8	19	27	11	21	32
Alf. + Lad. + 4 grasses	1	11	23	34	7	13	20	9	18	27

* number associations in average.

Table 7:- Pasture Trial 1950. Percentage of Alfalfa and Ladino in Pasture Mixtures in May of 1952 and 1953.

Association	1952			2 yr. mean 1952-1953		
	Total Alf.	Total Lad.	Total Legume	Total Alf.	Total Lad.	Total Legume
Alfalfa + Timothy	58			51		
+ Orchard	60			44		
+ Brome	74			60		
Ladino + Timothy		37			32	
+ Orchard		30			29	
+ Brome		51			34	
Alf. + Lad. + Timothy	25	23	47	20	22	41
+ Orchard	20	13	33	16	15	31
+ Brome	41	26	67	28	24	52
Alf. + Lad. + Tim. + Orch.	19	12	31	14	14	28
+ Brome	29	28	57	20	24	44
Orch. + Brome	25	21	46	16	19	34
Alf.+Lad.+Tim.+Orch.+Brome	16	20	36	12	22	34
+ M. Fesc. + Orch. + Brome	16	21	37	12	16	28
+ M. Fesc. + Orch. + R. Can.	8	28	36	8	25	33
Alf.+Lad.+Tim.+Orch.+Brome + M. Fesc.	11	23	34	9	18	27
Alf.+Lad.+R. Clover+Tim.+Brome	21	20	52	13	18	36
Alf. + R. Clover + Tim. + Brome	-	-	-	32	-	38

* trace red clover

** 6% red clover

Table 8:- Pasture Trial 1950. Percentage of D.M. Contributed by Each Species in May 1953.

Association	Alfalfa	Ladino	Total Legume	Timothy	Orchard	Brome	Meadow Fescue	Reed Canary
Alfalfa + Timothy + Orchard + Brome + Meadow Fescue + Reed Canary	44 28 45 46 56		44 28 45 46 56	56	72	55	54	44
Ladino + Timothy + Orchard + Brome + Meadow Fescue + Reed Canary		26 28 18 25 44	26 28 18 25 44	74	72	82	75	56
Alf. + Lad. + Timothy + Orchard + Brome	15 12 16	20 17 22	35 29 38	65	71	62		
Alf. + Lad. + Tim. + Orchard + Tim. + Brome + Orch. + Brome + Orch. + M. Fesc. + Orch. + R. Canary + Brome + M. Fesc. + M. Fesc. + R. Can.	10 11 6 6 13 22 10	15 21 17 20 18 19 28	25 32 23 26 31 41 38	1 40	74 75 71 71 69 23 59	28 2 3 36 59	3	3
Alf. + Lad. + Tim. + Orch. + Br. + M. Fesc. + Orch. + Br. + M. Fesc. + Orch. + R. Can.	9 8 8	23 12 22	32 20 30	1	66 75 65	1 1 14		
Alf. + Lad. + Tim. + Orch. + Br. + M. Fesc. + R. Clover + Tim. + Orch. + Brome + Lad. + R. Clover + Tim. + Brome + R. Clover + Tim. + Brome	7 28 5 32	13 30 16 38	20 2 21 48	1 2 52 48	75 67 27 14	1 1 27 14		3

?

Table 9:- Pasture Trial 1950. Percentage of D.M. Contributed by Each Grass at Three Harvest Dates in 1953.

Association	May	July	August
Alfalfa + timothy	56	61	63
+ orchard	72	88	78
+ brome	55	81	64
+ meadow fescue	54	79	57
+ reed canary	44	81	36
Ladino + timothy	74	43	27
+ orchard	72	70	54
+ brome	82	50	34
+ meadow fescue	75	59	35
+ reed canary	56	63	35

Table 10:- Pasture Mixture Trial 1950. Seasonal Average Percentage of Protein, Calcium and Phosphorus, 2 year mean 1951-1952.
Dry Matter Basis.

<u>Association</u>	<u>Crude Protein</u>	<u>Ca</u>	<u>P</u>
Kentucky Blue	15.0	.67	.302
Timothy	14.4	.57	.322
Orchard	14.8	.67	.460
Brome	17.5	.76	.351
M. Fescue	15.2	.79	.372
Reed Canary	17.6	.70	.404
Alfalfa	23.7	1.66	.350
Ladino	25.2	1.79	.356
Alfalfa + Timothy	20.3	1.22	.373
+ Orchard	19.9	1.27	.444
+ Brome	23.3	1.48	.366
+ M. Fescue	22.5	1.47	.391
+ R. Canary	23.4	1.60	.390
Ladino + Timothy	21.1	1.32	.332
+ Orchard	19.7	1.25	.398
+ Brome	22.8	1.44	.358
+ M. Fescue	23.6	1.51	.365
+ R. Canary	23.1	1.43	.367
Alf. + Lad. + Orch. + M. F. + R. C.	21.1	1.32	.411
Alf. + Lad. + Tim. + Orch. + B. + M.F.	20.4	1.31	.397
Red Clover + Timothy	18.8	1.21	.330
K. Blue + W. Dutch	21.8	1.20	.348

Table 11:- Pasture Trial 1950. Percentage of Crude Protein in Selected Mixtures. Dry Matter Basis.

Association	Cut No.	1951+	1952	1953	2 Year Mean 1951-1952
Kentucky	1	12.8	12.4	19.8	12.6
	2	14.3	19.2*	15.3	16.8
	3	18.6	15.2	12.5*	16.9
	4	--	13.8	15.4**	13.8=
Timothy	1	13.2**	13.1	24.0*	13.2
	2	15.1***	17.0*	13.9	16.0
	3	13.2***	13.4	16.5	13.3
	4	18.3***	12.1	12.1*	15.2
Orchard	1	11.8	11.9	20.7	11.8
	2	16.9	18.6	14.9	17.8
	3	14.0	15.0	13.7	14.5
	4	16.1	14.4	15.8	15.2
Brome	1	14.9	17.8	24.5***	16.4
	2	19.2	21.1	16.2	20.2
	3	17.1	19.3	16.7**	18.2
	4	-	15.2	18.7**	15.2=
Meadow Fescue	1	14.1	13.5	23.4*	13.8
	2	14.9	17.1	14.6*	16.0
	3	17.0	17.2	16.5**	17.1
	4	-	14.0	20.1**	14.0=
Reed Canary	1	14.2	15.8	23.3	15.0
	2	15.0	22.5	19.6	18.8
	3	18.4	18.2	14.7	18.3
	4	-	18.1	19.9**	18.1=
Alfalfa	1	25.1	25.2*	27.6**	25.2
	2	20.9	28.3	-	24.6
	3	24.9	19.7*	-	22.3
	4	-	22.6*	-	22.6=
Ladino	1	27.3	30.9*	31.7	29.1
	2	28.3	25.6	27.4	27.0
	3	22.9	20.4	22.9	21.6
	4	22.3	24.2*	25.2*	23.2
Alfalfa + Timothy	1	20.8	19.5	21.7**	20.2
	2*	20.8	21.2	19.4	21.0
	3	16.5	18.9*	17.1*	17.7
	4	21.7	22.8*	20.9*	22.2

Association	Cut No.	- 50 -			2 Year Mean
		1951+	1952	1953	1951-1952
Alfalfa + Orchard	1	18.5	18.2	20.3*	18.4
	2	20.0	22.7	20.0	21.4
	3	16.9	20.1*	15.3*	18.5
	4	20.7	21.7	18.9	21.2
Alfalfa + Brome	1	21.4	25.2	25.2*	23.3
	2*	19.6	28.4	23.7	24.0
	3	24.1	20.6*	18.5	22.4
	4	22.8	24.5*	24.2	23.6
Alfalfa + Meadow Fescue	1	20.5	23.0	25.2	21.8
	2	21.2	27.1	21.9	24.2
	3	20.2	20.1	17.8	20.2
	4	23.2	24.3*	22.9	23.8
Alfalfa + Reed Canary	1	23.0	24.3	24.6*	23.6
	2*	20.9	27.2	25.1	24.0
	3	23.9	23.5	17.8**	23.7
	4	20.3	24.6	24.8*	22.4
Ladino + Timothy	1	23.7	20.6	21.4	22.2
	2	25.4	19.1	19.7	22.2
	3	21.0	18.2	19.6	19.6
	4	20.9	19.9	22.3*	20.4
Ladino + Orchard	1	20.8	17.0	20.0	18.9
	2	22.5	20.8	23.4	21.6
	3	17.4	19.3	18.5*	18.4
	4	19.4	20.6	21.1	20.0
Ladino + Brome	1	23.6	25.2	23.7	24.4
	2	26.1	22.0*	24.9	24.0
	3	20.4	21.4	21.0	20.9
	4	22.3	21.9	24.3	22.1
Ladino + Meadow Fescue	1*	24.9	25.4	22.8	25.2
	2	25.2	23.3	22.5	24.2
	3	21.9	22.3	20.2	22.1
	4*	23.1	23.1	23.2	23.1
Ladino + Reed Canary	1	24.5	24.0	22.4	24.2
	2	26.0	23.7	26.6	24.8
	3	20.8	21.4	20.2*	21.1
	4	21.5	23.3	24.6	22.4
Alf. + Lad. + Orch. + M.F. + R.C.1	1	21.1	19.7	22.4	20.4
	2	23.0	23.2	23.5	23.1
	3	17.8	19.9	18.2	18.8
	4	21.2	22.7	20.3	22.0

- 51 -

<u>Association</u>	<u>Cut No.</u>	<u>1951+</u>	<u>1952</u>	<u>1953</u>	<u>2 Year Mean</u>	<u>1951-1952</u>
Alf. + Lad. + Tim. + Or. + Br. + M.F.	1	21.0	18.7	21.1	19.8	
	2	21.7	21.7	21.2	21.7	
	3	18.4	19.8	17.7	19.1	
	4	21.2	21.0	20.3	21.1	
Red Clover + Timothy	1	23.6	17.6	16.1	20.6	
	2	24.1	15.9	14.2*	20.0	
	3	17.1	15.3	16.6*	16.2	
	4	20.9	16.3	19.4*	18.6	
Kentucky Blue + White Dutch	1	26.4	21.1	20.6	23.8	
	2	25.6	21.9	21.2	23.8	
	3	20.3	18.1	17.8	19.2	
	4	22.6	18.1	22.1	20.4	

+ 6 reps in 1951 and 4 reps in 1952 & 1953.

*, **, *** 1, 2 and 3 missing plots respectively.

= 1952 values.

Table 12:- Pasture Trial 1950. Percentage of Calcium in Selected Mixtures. Dry Matter Basis.

Association	Cut No.	1951	1952	1953	2 Year Mean
					1951-1952
Kentucky Blue	1	.463	.325	.683	.394
	2	.718	.531*	.493	.624
	3	1.010	.713	.676*	.862
	4	-	.805	.867**	.805=
Timothy	1	.396	.366	.516*	.381
	2	.396	.440*	.409	.418
	3	.617	.594	.795	.606
	4	1.010	.711	.899*	.860
Orchard	1	.383	.350	.471	.366
	2	.620	.598	.474	.609
	3	.800	.779	.700	.790
	4	.887	.974	.946	.930
Brome	1	.485	.592	.622***	.538
	2	.470	.541	.469	.506
	3	.826	.926	.770*	.876
	4	-	1.100	1.100**	1.100=
Meadow Fescue	1	.552	.468	.605*	.510
	2	.449	.574	.485*	.512
	3	1.600	.874	.901**	1.237
	4	-	.884	1.080**	.884=
Reed Canary	1	.501	.677	.700	.589
	2	.621	.601	.543	.611
	3	.871	.729	.689	.800
	4	-	.808	1.03 **	.808=
Alfalfa	1	1.67	2.11 *	1.61 **	1.89
	2	1.49	1.87	-	1.68
	3	1.56	1.51 *	-	1.54
	4	-	1.52 *	-	1.52 =
Ladino	1	1.86	1.95 *	1.82	1.90
	2	1.68	1.91	2.06	1.90
	3	1.72	1.60	1.63	1.66
	4	1.73	1.65 *	1.78 *	1.69
Alfalfa + Timothy	1	1.380	1.27	.834**	1.325
	2	.678	1.12	.778	.899
	3	.868	1.36*	1.010*	1.114
	4	1.480	1.64*	1.37*	1.560

Association	Cut No.	1951	1952	1953	2 Year Mean
					1951-1952
Alfalfa + Orchard	1	1.230	1.38	.903*	1.305
	2	.699	1.48	.932	1.090
	3	.976	1.40*	.893*	1.188
	4	1.420	1.55	1.110	1.485
Alfalfa + Brome	1	1.34	1.96	.991*	1.65
	2	1.16	1.69	1.090	1.42
	3	1.13	1.44*	1.131	1.28
	4	1.49	1.66*	1.54	1.58
Alfalfa + Meadow Fescue	1	1.350	1.82	1.23	1.585
	2	.817	1.67	1.20	1.244
	3	1.260	1.68	1.06	1.470
	4	1.540	1.59*	1.49	1.565
Alfalfa + Reed Canary	1	1.60	2.09	1.38*	1.84
	2	1.35	2.00	1.31	1.68
	3	1.22	1.49	1.01**	1.36
	4	1.34	1.65	1.49*	1.50
Ladino + Timothy	1	1.44	1.03	.905	1.24
	2	1.60	1.23	1.000	1.42
	3	1.23	1.45	1.360	1.34
	4	1.43	1.15	1.57 *	1.29
Ladino + Orchard	1	1.18	.871	.825	1.026
	2	1.40	1.54	1.460	1.470
	3	1.13	1.32	1.26 *	1.225
	4	1.25	1.29	1.310	1.270
Ladino + Brome	1	1.44	1.35	.904 *	1.40
	2	1.84	1.52*	1.400	1.68
	3	1.21	1.36	1.320	1.28
	4	1.58	1.22	1.450	1.40
Ladino + Meadow Fescue	1	1.48	1.36	.905	1.42
	2	1.66	1.34	1.190	1.50
	3	1.50	1.62	1.350	1.56
	4	1.88	1.25	1.520	1.56
Ladino + Reed Canary	1	1.56	1.45	.851	1.50
	2	1.71	1.63	1.600	1.67
	3	1.37	1.16	1.320*	1.26
	4	1.45	1.10	1.59	1.28
A + L + O + M.F. + R. C.	1	1.28	.964	.870	1.122
	2	1.40	1.620	1.340	1.510
	3	1.17	1.330	1.25	1.250
	4	1.37	1.400	1.26	1.385

<u>Association</u>	<u>Cut No.</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>2 Year Mean</u>	<u>1951-1952</u>
A + L + T + O + B + M.F.	1	1.26	1.01	.849	1.14	
	2	1.39	1.52	1.170	1.46	
	3	1.13	1.34	1.130	1.24	
	4	1.42	1.40	1.280	1.41	
Red Clover + Timothy	1	1.55	.898	.609	1.224	
	2	1.61	.751	.458*	1.180	
	3	1.20	1.000	1.030*	1.100	
	4	1.65	1.050	1.470*	1.350	
Kentucky Blue + White Dutch	1	1.47	.906	.759	1.188	
	2	1.54	.926	1.080	1.233	
	3	1.12	1.070	1.20	1.095	
	4	1.39	1.120	1.55	1.255	

+ 6 reps in 1951 and 4 reps. in 1952 and 1953.
 *, **, *** = 1,2 and 3 missing plots respectively.
 = 1952 values.

Table 13:- Pasture Trial 1950. Percentage of Phosphorus in Selected Mixtures. Dry Matter Basis.

<u>Association</u>	<u>Cut No.</u>	1951	1952	1953	2 Year Mean 1951-1952
Kentucky Blue	1	.335	.300	.373	.318
	2	.304	.273*	.391	.288
	3	.343	.308	.334**	.326
	4	-	.277	.442***	.277=
Timothy	1	.293	.249	.411*	.271
	2	.426	.313*	.365	.370
	3	.327	.308	.449	.318
	4	.381	.278	.415*	.330
Orchard	1	.365	.314	.436	.340
	2	.458	.375	.484	.416
	3	.507	.502	.571	.504
	4	.603	.560	.349	.582
Brome	1	.348	.376	.427***	.362
	2	.505	.380	.435	.442
	3	.359	.318	.403*	.338
	4	-	.262	.374**	.262=
Meadow Fescue	1	.350	.304	.467*	.327
	2	.435	.343	.462*	.389
	3	.409	.413	.436**	.411
	4	-	.361	.429**	.361=
Reed Canary	1	.330	.320	.437	.325
	2	.431	.426	.493	.428
	3	.449	.416	.566	.432
	4	-	.433	.747**	.433=
Alfalfa	1	.354	.329*	.440**	.342
	2	.374	.423	-	.398
	3	.419	.314	-	.366
	4	-	.295*	-	.295=
Ladino	1	.347	.376*	.504	.362
	2	.445	.367	.449	.406
	3	.365	.276	.329	.320
	4	.328	.343*	.329**	.336
Alfalfa + Timothy	1	.339	.336	.444**	.338
	2	.508	.407	.441	.458
	3	.317	.376*	.344*	.346
	4	.324	.376*	.511*	.350

<u>Association</u>	<u>Cut No.</u>	1951	1952	1953	2 Year Mean
					1951-1952
Alfalfa + Orchard	1	.341	.321	.419*	.331
	2	.548	.445	.517	.496
	3	.472	.444*	.541*	.458
	4	.502	.479	.705	.490
Alfalfa + Brome	1	.368	.356	.453*	.362
	2	.383	.419	.496	.401
	3	.427	.319*	.446	.373
	4	.344	.312*	.388	.328
Alfalfa + Meadow Fescue	1	.365	.347	.499	.356
	2	.548	.404	.528	.476
	3	.418	.354	.467	.386
	4	.363	.329*	.487	.346
Alfalfa + Reed Canary	1	.366	.343	.437*	.354
	2	.370	.364	.579	.367
	3	.480	.394	.477**	.437
	4	.411	.392	.473*	.402
Ladino + Timothy	1	.357	.292	.425	.324
	2	.437	.338	.422	.388
	3	.360	.268	.338	.314
	4	.320	.286	.330*	.303
Ladino + Orchard	1	.348	.293	.394	.320
	2	.421	.354	.439	.388
	3	.434	.429	.450*	.432
	4	.463	.442	.513	.452
Ladino + Brome	1	.368	.326	.473*	.347
	2	.404	.389*	.498	.396
	3	.374	.345	.380	.360
	4	.352	.310	.414	.331
Ladino + Meadow Fescue	1	.373	.323	.462	.348
	2	.451	.351	.483	.401
	3	.392	.337	.422	.364
	4	.364	.333	.423	.348
Ladino + Reed Canary	1	.338	.296	.421	.317
	2	.418	.350	.474	.384
	3	.390	.402	.473*	.396
	4	.354	.387	.450	.370
A + L + C + M.F. + R.C.	1	.362	.354	.414	.358
	2	.448	.406	.457	.427
	3	.441	.396	.458	.418
	4	.438	.447	.538	.442

<u>Association</u>	Cut No.	1951	1952	1953	2 Year Mean 1951-1952
A + L + T + O + B + M.F.	1	.355	.324	.395	.340
	2	.437	.366	.463	.402
	3	.425	.416	.502	.420
	4	.412	.442	.626	.427
Red Clover + Timothy	1	.342	.289	.357	.316
	2	.426	.364	.389*	.395
	3	.302	.306	.367*	.304
	4	.308	.298	.394*	.303
Kentucky Blue + White Dutch	1	.360	.336	.428	.348
	2	.417	.332	.423	.374
	3	.380	.293	.370	.336
	4	.388	.284	.397	.336

* 6 reps. in 1951 and 4 reps. in 1952 and 1953.
 , *, **** = 1, 2 and 3 missing plots respectively.
 = 1952 values.

Table 14:- Pasture Test 1950. Percentage of Crude Protein in 1951 of Mixtures not listed in Tables 11, 12 and 13.

<u>Association</u>	<u>1*</u>	<u>2</u>	<u>3</u>	<u>4</u>
Alf. + Lad. + Tim.	23.1	24.3	20.0	22.5
+ Orch.	19.8	22.2	17.3	20.7
+ Brome	22.6	24.1	20.5	23.9
+ Fescue	23.4	23.9	21.9	22.9
+ R. Canary	24.0	26.6	21.9	23.5
Alf. + Lad. + T + O	22.1	22.1	17.4	20.7
+ T + B	21.9	22.7*	19.7	22.8
+ T + F	22.4	23.0	20.9	22.4
+ T + R. Can.	22.7	23.7	20.1	22.8
+ O + B	19.9	22.0	16.3	20.3
+ O + F	22.1	22.7	18.5	21.3
+ O + R. Can.	20.8	21.7	18.2	21.0
+ B + F	23.3	24.3	20.9	23.3
+ B + R. Can.	23.9	24.2	21.3	23.8
+ F + R. Can.	23.7	24.5	21.2	23.0
A + L + T + O + B	21.2	23.3	17.8	20.9
+ T + O + F	21.1	22.6	18.5	21.3
+ T + O + R. Can.	22.1	22.6	18.2	21.5
+ T + B + F	23.8	23.8	20.5	23.1
+ T + B + R. Can.	22.8	23.6	19.6	23.2
A + L + T + F + R. Can.	22.9	24.2	20.9	22.2
+ O + B + F	22.0	22.6	18.6	20.9
+ O + B + R. Can.	21.9	23.6	17.8	21.2
+ O + F + R. Can.	21.1	23.0	17.8	21.2
+ B + F + R. Can.	24.4	25.4	20.8	23.3
A + L + T + O + B + F	21.0	21.7	18.4	21.2
A + R.Cl. + T + O + B	21.9	22.3	17.3	20.6
A + L + R.Cl. + T + B	22.9	24.8	18.5	23.1
A + R.Cl. + T + B	23.2	22.9*	17.3	22.6

* Cut number i.e. May, June, July, August.

Table 15:- Pasture Test 1950. Percentage of Calcium and Phosphorus in 1951 of mixtures not listed in Tables 11, 12 and 13.

Association	Calcium				Phosphorus			
	1	2	3	4	1	2	3	4
Alf. + Lad. + Tim.	1.47	1.54	1.26	1.55	.341	.446	.369	.321
+ Orch.	1.17	1.24	1.08	1.36	.351	.444	.426	.420
+ Brome	1.34	1.78	1.29	1.63	.356	.424	.370	.351
+ Fescue	1.56	1.52	1.50	1.68	.350	.443	.398	.349
+ R. Can.	1.45	1.71	1.37	1.63	.346	.450	.423	.367
Alf. + Lad. + T + O	1.35	1.27	1.12	1.33	.366	.438	.441	.451
+ T + B	1.34	1.36*	1.15	1.55	.359	.469*	.355	.342
+ T + F	1.47	1.39	1.39	1.63	.342	.435	.366	.330
+ T + R.C.	1.35	1.38	1.23	1.55	.347	.447	.374	.322
+ O + B	1.13	1.22	.97	1.32	.347	.451	.426	.450
+ C + F	1.29	1.37	1.20	1.43	.363	.479	.445	.418
+ O + R.C.	1.24	1.25	1.19	1.39	.352	.428	.412	.440
+ B + F	1.45	1.56	1.40	1.71	.360	.439	.390	.371
+ B + R.C.	1.49	1.63	1.32	1.60	.357	.410	.396	.369
+ F + R.C.	1.54	1.52	1.44	1.57	.348	.454	.409	.368
A + L + T + O + B	1.33	1.39	1.12	1.39	.352	.436	.413	.434
+ T + O + F	1.40	1.36	1.17	1.41	.354	.463	.432	.434
+ T + O + R.C.	1.44	1.37	1.17	1.44	.337	.446	.427	.699
+ T + B + F	1.52	1.50	1.35	1.60	.361	.414	.399	.350
+ T + B + R.C.	1.31	1.56	1.26	1.62	.360	.442	.385	.352
A + L + T + F + R.C.	1.44	1.45	1.31	1.51	.358	.473	.384	.363
+ O + B + F	1.32	1.39	1.18	1.33	.354	.433	.408	.404
+ O + B + R.C.	1.43	1.39	1.15	1.42	.345	.445	.417	.382
+ O + F + R.C.	1.28	1.40	1.17	1.37	.362	.448	.441	.438
+ B + F + R.C.	1.25	1.63	1.30	1.59	.307	.443	.394	.347
A + L + T + O + B + F	1.26	1.39	1.13	1.42	.355	.437	.425	.412
A + R.C. + T + O + B	1.46	1.19	1.17	1.62	.341	.482	.387	.400
A + L + R.C. + T + B	1.43	1.51	1.21	1.63	.362	.449	.362	.329
A + R.C. + T + B	1.42	1.43*	1.20	1.68	.366	.479*	.348	.323

* Cut number i.e. May, June, July, August.

Rape and Kale Varieties

R.S. Fulkerson

R.P.O.: F.H. 13

Year Initiated: 1952

Objectives: As outlined in 1954 report.

Procedure: As outlined in 1954 report.

Results and Discussion:

This test was seeded at the regular date, July 12, but the extremely dry weather encountered throughout July and August produced a poor stand. Fall rains, however, gave good growth and the plots were harvested on November 10. Since the stand that established was so variable, the size of the plot harvested was reduced to that portion which had established best, but the variability in the test was still high.

The dry matter content in 1955 was about 3% higher than in 1954 due to harvesting being delayed about four weeks. For the most part, the rapes outyielded the kales again in 1955. The Gartons rape varieties gave the highest yield and the Sharpe kale varieties were superior. In tons of green matter produced, Gartons early giant rape was about three tons higher yielding than other rapes which in turn were eight to ten tons higher than most kales.

Summary:

Rape, as in previous years, outyielded kale. English varieties in both crops again proved to give a superior yield to the standard strains used in Ontario.

Rape and Kale Yields in Tons per Acre in 1955 and Two
Year Average

Variety	Green Weight	Percent D.M.	Green Wt. 2-Yr. Mean	Dry Matter	D.M. 2-Yr. Mean
Gartons English Rape	27.15	11.5	22.75	3.13	2.41
Gartons Early Giant Rape	30.88	11.2	25.34	3.48	2.63
Macdonalds Dwarf Essex Rape	20.04	11.6	19.34	2.32	2.03
Rennies Dwarf Essex Rape	27.04	12.0	- -	3.23	- -
Sharpes Rape-Kale	22.67	11.0	21.00	2.50	2.09
Sharpes Hungry Gap Kale	22.39	10.8	18.51	2.41	2.10
Sharpes 1000 Headed Kale	19.35	13.0	16.82	2.50	1.92
Gartons Marrowstem Kale	19.88	11.8	17.37	2.35	1.81
Macdonalds Green Marrowstem Kale	16.09	11.4	15.80	1.82	1.59
L.S.D. (0.05)				0.95	
C.V.				24.5	

Fertilizer Study with Orchard Grass

R.S. Fulkerson

R.P.O.: F.H. 14-1

Year Initiated: 1953

Objectives: As outlined in 1954 report.

Procedure: As outlined in 1954 report.

Results and Discussion:

In 1955 as in the two previous years, an application of ammonium nitrate increased the yield of orchard grass seed. The yield, however, was much lower than in previous years. Production had dropped to a level where the unfertilized section was not worth harvesting. The heavy rates of application in 1955 gave a good seed yield but were not economically sound. The broadcast stand in 1955 failed to produce seed heads and was not harvested for seed.

Rate of Application lbs./ac.	Brampton Row Seedings				Arkell Row Seedings 2-Yr. Mean	Brampton Broadcast 2-Yr. Mean	Mean of Tests
	1953	1954	1955	Mean			
100	787	322	144	416	364	396	392
200	729	320	166	404	344	446	398
300	893	409	178	493	354	416	421
400	696	339	192	409	371	520	433
500	847	361	239	462	362	455	426
Check	746	283	81	370	264	282	305
Mean	783	339	166	426	343	419	396

Summary:

The results obtained at Arkell and Brampton showed 100 pounds of ammonium nitrate increased yields of orchard grass seed about 25 percent. Heavier rates of application do not appear to be advantageous at these locations.

The Effect of Row Spacings and Rates of Seeding Upon
the Seed Yield of Orchard Grass and Timothy

R.S. Fulkerson

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

Year Initiated: 1954

Objectives:

The growing of orchard grass for seed in Ontario is a relatively new enterprise, timothy, an old one. The objectives of this study however, are the same with both species.

- (1) To study the effect of different row widths on the seed yield.
- (2) To study the effect of different rates of seeding upon the seed yield.

Procedure:

All plots were seeded on August 20, 1954 after a spring planting had failed from dry weather. A split plot design with 4 replications was used. The main plots are row widths, which vary from 7 to 35 inches at 7 inch intervals. The sub-plots are seeding rates, which range from $2\frac{1}{2}$ to 15 pounds per acre with orchard grass and $2\frac{1}{2}$ to 10 pounds per acre with timothy, each at $2\frac{1}{2}$ pound intervals. The orchard plots were harvested on July 8, the timothy on July 25. The harvested area of each plot was approximately 175 square feet. Quality studies were completed during the winter.

Results and Discussion

A. Orchard Grass

The results with this species are given in Tables 1 to 5. The first table shows that the heaviest seeding rates produced the fewest

number of stems in most row widths. In the 7 inch rows, $7\frac{1}{2}$ to 10 pounds per acre produced the most stems. As the row width increased, more stems were produced at a lower rate of seeding with $2\frac{1}{2}$ pounds superior for the 35 inch rows. The number of seed stems decreased with an increase in row width, the narrow rows producing about 4 times as many as 35 inch rows. The highest number of stems was obtained at the 10 pound rate in 7 inch rows.

The yield of seed produced (Table 2) appeared to be directly related to the number of stems. The best yield was obtained in the narrow drills and the yield decreased sharply when the width of row increased beyond 14 inches. The high and low rates of seeding gave the lightest seed yield with the heavy rates in wide drills depressing the yields the greatest. The 10 pound rate of seeding was sufficient seed in the narrow rows and the $2\frac{1}{2}$ rate in the 35 inch rows.

The seed weights, from the various rates and widths in Table 3, indicated a general decrease in seed weight with an increase in seeding rate, and an increase in weight with increase in row width. Therefore the heaviest seed was obtained at light rates in wide rows, the lightest seed in narrow rows at heavy rates.

The establishment of the seed from the plots is shown in Table 4. Only small variable differences were evident in the stand from the various rates and widths used. A similar picture was obtained when the seed was germinated in petri dishes, but here the germination percentage was approximately 90 percent.

Table 5 shows the average seedling height obtained at the rates

and row widths used. It indicates only small variable differences in seedling heights among the row spacings. Observation of the type of seedling growth obtained also pointed to the five row widths producing seedlings that were equally sturdy. Similar observations were noted with seeding rates where all rates used produced about the same type of seedling growth.

B. Timothy

The timothy results are shown in Tables 6 to 8. The seed yields in Table 6 indicated that the yield of seed decreased with an increase in the seeding rate from $2\frac{1}{2}$ to 10 pounds per acre. The $2\frac{1}{2}$ pound seeding rate was sufficient seed for a good yield in the row widths used. The 21 inch row width produced the highest yield. The lowest yield was obtained from the 7 inch rows.

The seed weights in Table 7 indicated no differences in the weight of seed among the seeding rates. Marked differences however, were present in the row widths. The weight of 1000 seeds increased as the row width increased from 7 to 28 inches and decreased slightly at the 35 inch width.

The seedling establishment with timothy is given in Table 8. The number of plants that established with this species was about 10% lower than with the orchard grass. All rates of seeding established an equal number of plants. The plant numbers from the various row widths however, appeared to decline as the width of row increased. Depression in plant numbers was also obtained at most rates of seeding in the wide drills. When the seed was germinated in petri dishes, the germination percentage was approximately 90 percent. Variation in plant numbers however was not

present with seed from the wider rows in this latter test.

Summary:

1. Light rates of seeding gave superior yields of seed with timothy; medium rates were superior with orchard grass.
2. Narrow rows gave the highest yield of seed with orchard grass; wide rows produced the highest yield with timothy.
3. Seed yields with orchard grass appeared to follow the same pattern as the number of seed stems produced.
4. The seed weight in both orchard grass and timothy increased as the row width increased from 7 to 28 inches.
5. There were no marked differences in the percentage of the seeds establishing plants with both orchard and timothy among rates of seeding and width of rows used.

Table 1:- Orchard Grass. Number of Stems per Square Foot, 1955.

Rate Seeding lbs./ac.	Row Width (in.)					Rate Mean
	7	14	21	28	35	
2 $\frac{1}{2}$	27.4	17.3	10.1	15.4	13.2	16.7
5	38.0	26.0	16.6	12.8	11.6	21.0
7 $\frac{1}{2}$	45.4	24.8	15.0	11.8	9.0	21.2
10	47.9	24.9	13.1	20.2	8.8	21.0
12 $\frac{1}{2}$	34.4	21.8	12.8	12.0	8.2	17.8
15	37.4	21.5	12.1	8.9	5.1	17.0
Row Mean	38.4	22.7	12.3	11.8	9.3	19.1

Row Spacings @ 5% - 2.2
1% - 3.2

Rates of Seeding @ 5% - 2.8
1% - 3.8

Row Spacings x Rates @ 5% - 6.4
1% - 8.4

C.V. - 23.7

Table 2:- Orchard Grass. Seed Yield in Pounds per Acre, 1955.

Rate Seeding lbs./ac.	Row Widths (in.)					Rate Mean
	7	14	21	28	35	
2½	147.0	108.8	88.2	144.9	152.1	128.2
5	185.3	193.1	157.2	154.6	156.5	169.4
7½	231.5	255.8	161.8	135.4	121.8	181.3
10	257.3	222.3	159.0	120.2	105.7	172.9
12½	246.2	206.9	137.9	119.1	104.1	162.8
15	229.9	188.9	133.8	102.5	73.2	145.7
Row Mean	216.2	196.0	139.6	129.5	118.9	160.0

Row Spacings @ 5% - 31.0 Spacings x Rates @ 5% - 61.5
1% - 43.4 1% - 81.9

Rates of Seeding @ 5% - 27.5 C.V. - 27.3%
1% - 36.6

Table 3:- Orchard Grass. Weight of 1000 Seeds in Grams, 1955.

Rate Seeding lbs./ac.	Row Spacing (in.)					Rate Mean
	7	14	21	28	35	
2½	1.215	1.224	1.236	1.295	1.296	1.253
5	1.200	1.186	1.241	1.283	1.314	1.245
7½	1.162	1.242	1.277	1.268	1.272	1.244
10	1.154	1.206	1.250	1.268	1.245	1.225
12½	1.110	1.232	1.282	1.258	1.262	1.229
15	1.124	1.168	1.255	1.273	1.235	1.211
Row Mean	1.161	1.210	1.257	1.274	1.271	1.234

Row Spacings @ 5% - 0.54
1% = 0.76

Rates of Seeding @ 5% - 0.26

Table 4:- Orchard Grass. Percent Establishment in Soil, 1955.

Rate Seeding lbs./ac.	Row Spacing (in.)					Rate Mean
	7	14	21	28	35	
2 $\frac{1}{2}$	71.7	75.0	70.3	66.0	79.5	70.5
5	71.2	67.7	74.7	77.2	76.0	73.3
7 $\frac{1}{2}$	71.0	74.0	70.5	71.5	69.7	71.3
10	77.7	79.2	73.2	73.2	70.5	74.7
12 $\frac{1}{2}$	84.5	68.0	75.0	77.5	68.2	74.6
15	75.7	74.5	77.5	74.5	73.2	75.0
Row Mean	75.3	73.0	73.5	73.3	72.8	73.5

Table 5:- Orchard Grass. Seedling Heights in Centimeters at 27 days, 1955.

Rate Seeding lbs./ac.	Row Spacing (in.)					Rate Mean
	7	14	21	28	35	
2 $\frac{1}{2}$	9.5	8.7	8.7	9.1	9.8	9.2
5	9.6	8.7	9.5	9.9	8.8	9.3
7 $\frac{1}{2}$	9.9	9.8	9.5	10.0	9.5	9.7
10	10.0	9.9	8.8	8.5	9.5	9.3
12 $\frac{1}{2}$	10.1	9.1	9.3	8.8	9.2	9.3
15	10.4	9.6	10.6	9.1	9.7	9.9
Row Mean	9.9	9.3	9.4	9.2	9.4	9.4

Table 6:- Timothy. Seed Yield in Pounds per Acre, 1955.

Rate Seeding lbs./ac.	Row Spacing (in.)					Rate Mean
	7	14	21	28	35	
2 $\frac{1}{2}$	295.2	349.4	395.7	404.1	374.0	363.7
5	267.8	353.4	365.2	361.0	338.9	337.3
7 $\frac{1}{2}$	301.4	359.2	393.0	340.3	323.4	343.5
10	249.0	347.0	376.3	327.4	309.9	321.3
Row Mean	278.4	352.2	382.5	358.2	335.8	341.4

Row Spacings @ 5% - 58.2
C.V. - 9.1%

Rates of Seeding @ 5% - 23.3
1% - 36.1

Table 7:- Timothy. Weight of 1000 Seeds in Grams, 1955.

Rate Seeding lbs./ac.	Row Spacing (in.)					Rate Mean
	7	14	21	28	35	
2 $\frac{1}{2}$.291	.310	.332	.344	.359	.327
5	.303	.318	.323	.354	.337	.327
7 $\frac{1}{2}$.300	.321	.329	.351	.335	.327
10	.325	.327	.339	.359	.339	.337
Row Mean	.304	.318	.331	.352	.343	.330

Row Spacings @ 5% - .016
1% - 0.23

C.V. - 5.4%

Table 8:- Timothy. Percent Establishment in Soil, 1955.

Rating Seeding lbs./ac.	Row Spacing (in.)					Rate Mean
	7	14	21	28	35	
2½	61.0	63.0	68.0	61.3	58.3	62.3
5	62.0	63.0	67.6	49.3	59.3	60.2
7½	70.0	67.0	59.0	58.3	63.0	63.4
10	69.0	60.3	59.0	58.6	64.0	62.2
Row Mean	65.5	63.3	63.4	56.8	61.1	62.0

Alsike Seed Production Project

R.S. Fulkerson

R.P.O.: F.H. 14

Year Initiated: 1954

Objective: As outlined in 1954 report.

Procedure: The methods used in treating and harvesting this crop were similar to those in 1954. The crop grown at Brampton was sprayed by the Department of Entomology to control the clover head weevil on June 7. Bees were placed in the field on the same day at approximately three colonies per acre. The crop had been seeded in 1954 with a companion crop of oats and ten pounds per acre. Approximately 300 pounds of 4-24-12 fertilizer was applied at seeding time and 300 pounds of 4-12-10 in the spring of 1955.

The alsike crop bloomed and ripened early in 1955. The crop was swathed on July 12 and direct combined on July 20. Six replications of swathing and direct combining were used for harvesting methods, each plot of which was about $\frac{1}{4}$ of an acre in size.

Results and Discussion:

The alsike crop in 1955 was as good a stand as in 1954 but produced a much lower yield of seed. Direct combining the alsike in each of the six replications gave the largest seed yield. The seed harvested in this manner was also slightly plumper and was a higher seed weight. The germination and hard seed percentage was the same in swathed as the direct combined seed.

Harvesting Methods on Yield of Alsike Seed in Pounds
Per Acre

Harvesting Method	1955 Yield	1954 Yield	Percent Tailings	Weight 1000 Seeds (gms.)	% Germin- ation	% Hard Seeds
Swath and combine	180	346	38	.6061	94.8	29.3
Direct combine	294	407	26	.6189	95.8	30.3

Summary:

1. The alsike crop produced a lower seed yield in 1955 than in 1954.
2. Direct combining alsike gave a higher seed recovery than swathing and combining in both 1954 and 1955.
3. The method of harvesting used had little effect on the quality of the seed.

The Effect of Rate of Seeding and Row Spacing of an Oat Companion Crop Upon Forage Seedling Establishment

Fulkerson, R.S.

R.P.O.: F.H. 15-3

Year Initiated: 1953

Objectives: As outlined in the 1954 report.

Procedure: As outlined in the 1954 report.

Results and Discussion:

The results obtained in 1955 were similar to those of a year ago. The seeding rate of the oats had little effect on the yield of grain but the wide drill spacings, as in 1954, depressed yields about 15% below those from corresponding rates in narrow drills.

The alfalfa stand, as with most of the species used, decreased as the oat rate of seeding increased. The reduction was slight until the $1\frac{1}{2}$ bushel rate was reached, beyond which the alfalfa stand decreased rather sharply. The best stand was obtained where no companion crop was used. Wide drills gave about the same stand as light seedings in narrow drills. In the wide drills, however, in both years the stand increased with seeding the rate to the $1\frac{1}{2}$ bushel level beyond which a lower stand was obtained.

In all species the lighter the seeding rate the sturdier the established plants. At the normal $2\frac{1}{2}$ bushel rate of seeding oats, the plants were only half as tall as where no companion crop was used. In the $1\frac{1}{4}$ inch drills all plants were more vigorous and taller than in the 7 inch drills.

Red clover, like alfalfa, decreased in stand with an increase in the oat rate of seeding. The $1\frac{1}{4}$ inch drills gave about twice the stand as the 7 inch drills.

The total legume stand also showed the division in plant population which occurred when the seeding rate was increased in the narrow drills beyond the $1\frac{1}{2}$ bushel mark. In the wide drills, the stand improved as the seeding rate increased to the $1\frac{1}{2}$ bushel level. This increase in stand, in both red clover and alfalfa, followed by a marked decrease in stand was present in both years.

The brass establishment picture has been approximately the same in both years of the study. Timothy, though it established poorly in 1955, gave about twice the stand in the light vs. the heavy seeding rates, with the break again coming in the narrow drills at the $1\frac{1}{2}$ bushel mark. Orchard and brome established well with the latter species giving a better stand than in 1954. The picture among the grasses and seeding rates in the wide drills was the same as with the legumes, but the grasses in general produced a higher stand in the narrow drills at corresponding seeding rates.

Summary:

1. Oats seeded in $1\frac{1}{4}$ inch drills gave a 15% lower yield than when seeded in 7 inch drills.
2. Increasing the rate of seeding oats in 7 inch drills depressed the stand establishment of all species but gave the greatest depression when the rate was increased beyond the $1\frac{1}{2}$ bushel level.
3. In $1\frac{1}{4}$ inch drills the establishment of the legumes increased as the seeding rate increased to $1\frac{1}{2}$ bushels and the stand of both grasses and legumes decreased with a further increase in the oat seeding rate.
4. All plants were more vigorous and sturdy in the wide than in the narrow drills.

Table 1:- Effect of Seeding Rate of Oats on Oat Yield and Forage Establishment
Plants per Square Foot, 1955.

Seeding Rate	Oat Yield bu./ac.	Legume Stand and Vigor						Grass Stand				Total Stand	
		Alfalfa		Red Clover	Total Legume 1955	Total Legume 54-55	Tim.	Orch.	Brome	Total Grass 1955	Total Grass 54-55	Mean 1955	Mean 54-55
		Alf.	Height cms.										
7" Drills	0 --	12.5	33.9	9.6	22.0	21.6	1.7	10.7	5.2	17.6	17.7	39.6	39.4
	$\frac{1}{2}$ 51.7	12.1	18.7	3.5	15.5	17.4	1.4	11.9	5.5	18.8	19.4	34.3	36.8
	1 49.6	11.5	14.5	2.8	14.3	15.9	1.0	10.1	4.2	15.3	17.0	29.6	33.0
	$1\frac{1}{2}$ 55.6	10.0	18.0	2.4	12.4	15.9	1.5	9.3	4.8	15.7	15.3	28.1	31.2
	2 55.6	7.2	17.3	1.2	8.4	13.6	0.8	9.2	4.3	14.3	15.1	22.7	28.7
	$2\frac{1}{2}$ 52.8	7.3	16.9	1.8	9.1	13.3	0.8	8.2	4.2	13.2	14.8	22.3	28.2
	3 47.7	8.5	15.2	1.2	9.7	13.2	0.4	8.5	4.7	13.5	15.3	25.3	29.6
	$3\frac{1}{2}$ 52.0	8.6	14.8	2.0	10.7	12.3	0.3	7.4	3.4	11.2	12.0	21.8	24.3
	4 49.4	7.9	14.9	1.0	8.9	12.3	0.4	7.2	3.9	11.5	13.7	20.4	25.9
L.S.D. (0.05)	N.S.				3.7					4.8		6.3	
C.V.	11.0				23.5					22.6		17.9	
14" Drills	$\frac{1}{2}$ 41.2	9.8	20.5	4.3	14.1	16.5	0.6	8.6	4.9	14.1	16.4	28.2	32.4
	1 46.3	11.9	21.4	3.7	15.6	17.5	0.5	8.7	4.4	13.6	16.6	29.2	34.1
	$1\frac{1}{2}$ 47.5	13.0	20.7	5.5	18.6	20.1	1.1	9.1	4.3	14.4	16.9	32.9	37.1
	2 45.6	11.4	23.2	3.4	14.8	15.6	0.7	8.5	3.6	12.8	15.0	27.6	30.6
L.S.D. (0.05)	N.S.	--	--	--	--	--	--	--	--	N.S.	--	--	--
C.V.	7.8	--	--	--	17.9	--	--	--	--	20.4	--	12.8	--
Mean of $\frac{1}{2}$ -2 bu. rates													
7" Drills	53.1	10.2	17.1	2.5	14.6	15.7	1.2	10.1	4.6	16.0	16.7	28.7	32.4
14" Drills	45.6	11.5	21.4	4.2	15.7	17.4	0.7	8.7	4.3	13.7	16.2	29.5	33.5

Methods of Seeding Alfalfa and Brome Grass

Fulkerson, R.S. and Byers, G.L.

(Field Husb. and Ag. Eng.)

R.P.O.: F.H. 15-7

Year Initiated: 1954

Objectives:

To compare the effect of the following factors on the establishment of a mixture of alfalfa and brome grass on a heavy clay soil.

(1) A firm versus a loose seed bed.

(2) Different methods of seeding.

Procedure:

The procedure used in 1955 was similar to that used in 1954. The plot area was again on a Haldimand clay soil type that had been fall plowed. The land was prepared in the spring by disking twice cultivating and harrowing. The firm seed bed had in addition a cultipacking and harrowing. All plots were 13' x 50' seeded on May 7th with oats at $2\frac{1}{2}$ bushels, 4-24-12 fertilizer at 300 pounds and 10 pounds each of alfalfa and brome grass per acre.

Five core samples, $3\frac{1}{2}$ " in diameter and 4" deep were taken in each plot again in 1955. These were used for volume weight determinations as an index to the compactness of seedbed following the various seeding methods. Stand counts were made on September 1 and are used as the index to establishment.

Results and Discussion:

In 1955 as in 1954, significant differences were not obtained between the loose and firm seed beds. This was the case in the

degree of compactness as well as the stands of alfalfa and brome grass established. In 1955, though a different method was used to prepare the seed beds, the volume weight picture remained the same as in 1954. Small differences were present however, among the seeding methods in the degree of compactness.

The methods of seeding used in 1955 gave stand differences in both alfalfa and brome grass. With alfalfa, methods where packing before seeding took place gave the superior stands. This included the Brillion method where the soil is also packed before seeding. These results are the reverse of those obtained in 1954. In that year packing after seeding proved the best. The Brillion method of seeding brome grass gave the poorest stand again in 1955. All other methods of seeding this species gave about the same stand.

Superior stands of both alfalfa and brome grass were obtained in 1955 with approximately twice as many plants establishing as in 1954. The percentage establishment however, is still low, particularly with brome grass. The variability in the brome counts was high. This might be expected however, where the percent establishment was so low.

Summary:

In 1954 and 1955 no difference was obtained in establishing alfalfa and brome grass on a loose vs. a firm seed bed. Both brome grass and alfalfa established more plants per unit area in 1955 but the brome grass establishment was still only six percent of the seed sown. Packing before seeding gave the best

results with alfalfa in 1955. All methods gave similar results with brome grass with the exception of the Brillion seeder which has given the poorest stands in both years of the study.

Establishment of an Alfalfa and Brome Grass Mixture in
Plants per Square Foot at Brampton

Method of Seeding	ALFALFA										BROME GRASS					Volume Weight (grams)	
	1955					1955					1955						
	Loose	Firm	Mean	Mean	Mean	Year	Mean	percent	Loose	Firm	Mean	Mean	Mean	percent			
Grain drill and harrow	11.5	13.8	12.6	8.1	10.3	24.3	1.8	2.9	2.3	1.5	1.9	6.0		2506			
Grain drill & pack before	20.9	19.6	20.2	7.5	13.8	38.9	1.9	2.4	2.2	1.6	1.9	5.8		2471			
Grain drill & pack after	15.7	16.8	16.3	9.3	12.8	31.4	2.1	2.4	2.2	1.5	1.8	5.8		2328			
Grain drill & pack before & after	18.4	22.0	20.2	9.4	14.8	38.9	2.6	3.3	3.0	1.3	2.1	7.9		2397	1		
Brillion seeder	19.7	23.9	21.8	6.0	13.9	42.0	1.2	0.4	0.8	0.9	0.8	2.1		2316	1		
Band seeder	12.6	16.8	14.7	5.1	9.9	28.3	2.2	2.7	2.5	1.1	1.8	6.6		2502			
Band seeder & pack after	15.1	17.2	16.1	8.0	12.0	31.0	2.3	3.0	2.6	1.5	2.0	6.8		2466			
Mean	16.3	18.6	17.4	7.6	12.5	33.5	2.0	2.4	2.2	1.3	1.7	5.8		2426			
L.S.D. (0.05) (0.01)			3.2	1.7						0.9	N.S.			134			
			4.2	2.2						1.2							
C.V.			17.9	21.5						40.6	42.8			5.5			

Seedling Establishment in Alfalfa and Red Clover Following

Seed Treatment With Fungicides

R.S. Fulkerson

R.P.O.: F.H. 15-1

Year Initiated: 1949

Objectives: As outlined in 1954 report.

Procedure: As outlined in 1954 report.

Results and Discussion:

Seed treatment of red clover and alfalfa produced only small initial stand increases at Guelph and no increases at Barrie in 1955. The fall stand counts at Guelph showed the establishment of alfalfa to be about the same as in the spring; but with red clover, the stand in the fall was much better where Leytosan P and Arasan had been used. At Barrie, the combination of the light sandy soil type and the dry year was too severe and all stands were so severely thinned that the tests were discarded. The mean establishment over both Guelph and Barrie indicate however, that treatment with some fungicides will increase at least the initial establishment of alfalfa and red clover.

Summary:

1. Seed treatment of red clover and alfalfa produced only small initial stand increases at Guelph and no increases at Barrie in 1955.

2. Results for the past three years indicate that the initial stand of legumes might establish better if their seed is treated with a suitable fungicide.

The Effect of Fungicides on the Plants Per Square Foot Established

Fungicide	Alfalfa					Red Clover				
	Guelph			Barrie		Guelph			Barrie	
	Spring	Fall	2-yr. mean	Spring	2-yr. mean	Spring	Fall	3-yr. mean	Spring	3-yr. mean
Arasan	21.4	28.2	24.8	21.4	21.2	31.1	24.4	30.1	25.8	34.4
Ceresan M	33.7	38.0	29.9	25.7	24.9	33.2	18.1	31.9	26.4	31.1
Phygon	31.8	30.6	31.1	25.2	23.8	29.3	18.8	30.8	24.3	26.5
Leytosan P	27.8	24.9	28.0	22.2	24.2	24.0	27.1	31.3	24.1	31.7
Leytosan P Ex	23.8	30.8	29.6	30.7	30.2	20.2	24.6	31.4	23.9	30.9
Leytosan	33.6	21.5	- -	26.9	- -	21.3	18.9	- -	25.6	- -
Check	23.1	26.8	24.3	25.4	22.1	25.2	18.9	23.0	25.9	27.1
L.S.D. (0.05)	5.2	N.S.		N.S.		7.8	5.8		N.S.	
G.V.	12.6	24.8		21.4		20.1	18.3		15.4	