

### Grass Seed Fertility Experiment

The objectives of the grass seed fertility experiment in recent years has been threefold:

1. To determine the proper timing of the nitrogen application.
2. To determine if the nitrogen should be applied as one application or as a split application with a portion in the fall and the remainder of the nitrogen spring applied.
3. To obtain some information each year of the experiment on the value of potash, phosphate and sulfur fertilizers.

Three locations of the experiment were established for the 1963 season. The results by location are as follows:

Verne Cunningham Farm - Culver, Oregon  
 Climax Timothy  
 1962 - Marfed Spring Wheat  
 Climax fall seeded. There was quite a lot of Marfed volunteer in the Timothy seeding.  
 Soil type: Agency Loam

#### Soil Analysis (Fall 1962)

Soil Depth	pH	#/A P <sub>2</sub> O <sub>5</sub>	#/A K <sub>2</sub> O	Me/100 gms. soil				PPM B	% OM
				K <sub>2</sub> O	Ca.	Mg.	CEC		
0-8	6.1	22.0	638	0.84	7.4	5.1	16.1	0.55	1.53
8-16	6.1	17.5	471	0.62	8.8	5.9	18.6	0.61	1.25
16-24	6.9	2.5	372	0.49	16.8	10.3	25.3	0.40	0.76

Because of the press of other work, it was impossible to get out the fertilizers as early as would be desirable.

The first fertilizer application date was December 4, 1962. At that time all of the phosphate, potash and sulfur fertilizers were applied. The "fall" nitrogen applications were at this time. This late application date for nitrogen limited the information which could be obtained from the experiment.

The other nitrogen application dates were as follows:

December 17, 1962  
 January 16, 1963  
 February 18, 1963  
 March 18, 1963

The spring portion of the split applications were made on the March application date.

The Timothy was starting to head on June 17, 1963 and nitrogen responses were clearly apparent. From observation, no visible responses to potash, phosphate, or sulfur were recorded.

The mean yield and significance at the 5% level are shown in Table No. 4. At this location, the seed was originally divided into light and heavy seed, as the following locations will be, but because of difficulties encountered in the separation, the two lots were re-combined. When separated there was almost as much difference in bushel weight between treatments in the heavy weight class as there was between the light and heavy seed classes.

Yields are therefore reported as total seed with a bushel weight of approximately fifty-seven pounds for all treatments.

Interpretation of results from individual locations is generally clouded by treatments which persist in behaving a little differently than normal. At this location, late applications of nitrogen--February and March and split applications receiving seventy-five or one hundred pounds of Nitrogen in March--were relatively higher yielding than might be expected from bluegrass trials. Whether this is a chance variation or a characteristic difference of Timothy, perhaps associated with the time of primordial development, is impossible to delineate at this time.

The greater response to phosphate obtained at this location may be explained by the medium phosphate level, particularly when the other elements are at a relatively high level.

Yields by replications are presented in Appendix Table No. 4 .

Leslie Ramsey, Jr. Farm - Madras, Oregon

C-1 Kentucky Bluegrass

Cropping History:

1962 C-1 Kentucky Bluegrass - 100# N late Nov. or Dec.

1961 C-1 Kentucky Bluegrass - 100# N late Nov. or Dec.

1960 Seeded to C-1 Kentucky Bluegrass

Soil Type: Madras Sandy Loam

#### Soil Analysis (Fall 1962)

Soil Depth	pH	#/A P <sub>2</sub> O <sub>5</sub>	#/A K <sub>2</sub> O	Me/100 gms. soil				PPM B	% OM
				K <sub>2</sub> O	Ca.	Mg.	CEC		
0-8	6.5	28.5	843.6	1.11	11.4	5.9	20.7	0.49	1.74
8-16	6.9	4.5	570.0	0.75	14.0	6.8	22.9	0.52	1.36
16-24	7.7	2.5	418.0	0.55	23.8	9.2	25.8	0.49	0.76

The fertilizer application dates were as follows:

Phosphate, Potash and Sulfur - December 5, 1962

Nitrogen:

Fall - December 5, 1962

December 17, 1962

Winter - January 16, 1963

February 18, 1963

Spring - March 18, 1963

During the growing season, phosphate, potash and sulfur responses were never apparent vegetatively. The differences in vegetative appearances due to time of nitrogen application were not as apparent at this location as at the other two locations. No lodging was apparent in any plots.

Table No. 5 shows the fertilizer treatment, bushel weight, percentage of light seed, average heavy seed yield and multiple range significance at the 5% level. The seed from the bluegrass locations is divided into two lots, heavy and light. The bushel weight of the heavy seed of each plot at this location was 27.50 pounds per bushel. The light seed weight and bushel weight are shown in Appendix Table No. 5.

At the Ramsey location, there was a significant sulfur response when compared to the "check" treatment (i.e.) 80# P<sub>2</sub>O<sub>5</sub>, 80# K<sub>2</sub>O, 80# S, and 150# N fall applied. This check was also significantly higher yielding than like amounts of N applied as single units during the winter and spring months as well as two of the split applications of nitrogen.

The heavy seed yields by replicate are shown in Appendix Table No. 6.

Everett Cloud Farm - Culver, Oregon

Kentucky Bluegrass

Cropping History:

1962 - Kentucky Bluegrass 750 - 800# seed

1961 - Kentucky Bluegrass 410# seed, 600# 20-15

1960 - Kentucky Bluegrass, volunteer grain, cheatgrass

1959 - Fall Seeding Kentucky Bluegrass following spring wheat.

This is the same field reported as John D. Steinbeck in the 1962 report.

Soil Type: Agency Loam

Soil Analysis (Fall 1962)

Soil Depth	pH	#/A P <sub>2</sub> O <sub>5</sub>	#/A K <sub>2</sub> O	Me/100 gms. soil				PPM B	% OM
				K <sub>2</sub> O	Ca.	Mg.	CEC		
0-8	6.2	64.0	904.4	1.19	6.9	5.3	16.7	0.49	1.74
8-16	6.5	12.5	676.4	0.89	7.2	6.5	17.4	0.49	1.14
16-24	7.0	2.5	714.4	0.94	10.2	11.0	25.6	0.46	0.55

The fertilizer application dates were as follows:

Phosphate, potash, sulfur and the fall application of nitrogen were applied on December 5, 1962

Winter

December 17, 1962

January 16, 1963

February 18, 1963

Spring

March 18, 1963

Table No. 6 presents the bushel weight, percentage light seed, average seed yield, and significance at the 5% level for the Cloud location. At this location the yields were adjusted to a twenty-seven pound per bushel weight. The light seed yields and bushel weight for light seed and heavy seed are found in Appendix Table Nos. 7 and 8.

The percentage of light seed, Table No. 6 at this location was lower than usual, probably indicating close to optimum fertility and irrigation. The yields followed approximately the normal pattern of yield responses for this series of treatments. The apparent increases from phosphate and potash are very difficult to explain in light of soil analysis taken at this site, however, neither treatment is significantly different from the comparable treatment including phosphate and potash.

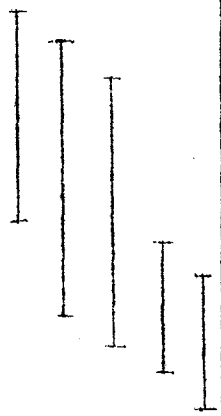
Table No. 7 is a summary of six of the seven locations of this experiment grown during the last two years. The table shows the average yield for each location and the percentage of a check treatment; the treatment containing phosphate, potash, sulfur and a single fall early application of nitrogen. This table indicates a slight advantage in including phosphate, potash and sulfur in the annual application. Also, it shows that at least on the finer textured soils (Agency and Madras) it is better to apply nitrogen as one unit in the fall than to split the nitrogen application. This statement possibly would not hold true under conditions of heavy leaching.

Not enough information is available to evaluate accurately the effects of early fall applications (September, October and probably November) but it appears that applications later than the middle of December result in reduced yields. Single applications in March or later tend to increase the foliage but fail to stimulate seed production.

Table No. 4

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application and Time of Nitrogen Application on the Total Seed Yield and Bushel Weight of Climax Timothy

Verne Cunningham Farm, Culver, Oregon - 1963

Fertilizer Application-Pounds Per Acre						Bushel Weight	Average Seed Yield	(1) Significance 5% Level
P2O5	K2O	S	Nitrogen					
			Fall	Winter	Spring			
80	80	0	150	-	-	Approx. 57#	595.1	
80	0	80	150	-	-		511.0	
80	80	80	-	F 150	-		495.3	
80	80	80	150	-	-		478.9	
80	80	80	-	-	150		461.6	
80	80	80	75	-	75		442.4	
0	80	80	150	-	-		436.4	
80	80	80	-	J 150	-		426.6	
80	80	80	50	-	100		405.7	
80	80	80	-	D 150	-		405.7	
80	80	80	100	-	50		344.6	
80	80	80	-	-	-		253.1	
0	0	0	-	-	-		217.5	

Coefficient of Variation = 23.4%

(1) Any two treatments covered by the same line are not significantly different in yield.

Fertilizer Application Dates:

Fall

December 4, 1962

Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

Spring

March 18, 1963

Table No. 5

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application and Time of Nitrogen Application on the Seed Yield, Bushel Weight and Percentage of Light Seed of C-1 Kentucky Bluegrass

Leslie Ramsey, Jr. Farm, Madras, Oregon - 1963

Fertilizer Application-Pounds Per Acre						% Light Seed	Average Seed Yield #/Acre	Significance at 5% Level <sup>(1)</sup>
P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Nitrogen					
			Fall	Winter	Spring			
80	80	80	150	-	-	24.7	724.3	
80	80	80	100	-	50	25.4	651.1	
80	0	80	150	-	-	26.7	625.1	
0	80	80	150	-	-	24.9	613.8	
80	80	80	50	-	100	25.2	589.0	
80	80	80	-	D 150	-	23.7	570.2	
80	80	80	-	J 150	-	29.0	560.7	
80	80	0	150	-	-	35.1	541.9	
80	80	80	75	-	75	25.2	500.8	
80	80	80	-	-	150	21.0	446.0	
80	80	80	-	F 150	-	14.5	352.8	
80	80	80	-	-	-	29.5	116.8	
0	0	0	-	-	-	35.2	103.0	

Coefficient of Variation = 18.1%

All lots separated at a bushel weight of 27.50 pounds

(1) Any two treatments covered by the same line are not significantly different in yield.

#### Fertilizer Application Dates

##### Fall

December 5, 1962

##### Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

##### Spring

March 18, 1963

Table No. 6

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application and Time of Nitrogen Application on the Seed Yield, Bushel Weight and Percentage of Light Seed of Kentucky Bluegrass.

Everett Cloud Farm, Culver, Oregon - 1963

Fertilizer Application-Pounds Per Acre						% Light Seed	Average Seed Yield #/Acre	Significance at 5% Level	(1)
P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Nitrogen						
			Fall	Winter	Spring				
80	80	0	150	-	-	13.9	778.1	I	
80	80	80	150	-	-	15.7	681.4		
80	80	80	75	-	75	14.5	680.5		
80	80	80	100	-	50	17.6	652.6		
0	80	80	150	-	-	14.9	647.0		
80	80	80	-	F 150	-	15.9	618.0		
80	80	80	-	J 150	-	14.7	609.7		
80	0	80	150	-	-	19.6	585.1		
80	80	80	50	-	100	16.4	560.9		
80	80	80	-	D 150	-	14.9	548.8		
80	80	80	-	-	150	22.8	309.8		I
80	80	80	-	-	-	27.9	74.0		I
0	0	0	-	-	-	22.6	68.4		I

Coefficient of Variation 16.1%

All lots separated at 27 pounds per bushel level.

(1) Any two treatments crossed by same line are not significantly different

#### Fertilizer Application Dates

##### Fall

December 5, 1962

##### Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

##### Spring

March 18, 1963

Table 7  
 Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Treatment and Nitrogen  
 Fertilizer Application Date on the Seed Yield of Several Grass Varieties  
 during 1962 and 1963 in Central Oregon  
 Seed Yields are in Pounds Per Acre

Fertilizer Application - Pounds Per Acre						1962			1963			% Check Treatment for Years Compared
						P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Nitrogen (1)			
Fall	Winter	Spring										
0	0	0	-	-	-	39.2	33.0	51.5	217.5	68.4	103.0	13.0
80	80	80	-	-	-	78.0	32.8	29.4	253.1	74.0	116.8	14.9
0	80	80	150	-	-	712.1	912.4	289.2	436.4	647.0	613.8	91.9
80	0	80	150	-	-	695.8	774.8	345.7	511.0	585.1	625.1	90.0
80	80	0	150	-	-	585.1	985.0	302.7	595.1	778.1	541.9	96.4
80	80	80	150	(Check Treatment)	-	803.4	890.9	350.7	478.9	681.4	724.3	100.0
80	80	80	N 150	-	-	403.3	699.7	307.8	-	-	-	69.0
80	80	80	D 150	-	-	620.7	784.8	340.3	405.7	548.8	570.2	83.2
80	80	80	-	J 150	-	456.0	849.0	307.5	426.6	609.7	560.7	81.7
80	80	80	-	F 150	-	383.7	733.5	315.3	618.0	352.8	383.7	73.8
80	80	80	-	-	M 150	-	-	-	461.6	309.8	446.0	64.6
80	80	80	150	(Check Treatment)	-	803.4	890.9	350.7	478.9	681.4	724.3	100.0
80	80	80	100	-	50	-	-	-	344.6	652.6	651.1	87.5
80	80	80	75	-	75	-	-	-	442.4	680.5	500.8	86.2
80	80	80	50	-	100	333.4	744.6	267.9	405.7	560.9	589.0	73.8
80	80	80	150	(Check Treatment)	-	803.4	890.9	350.7	478.9	681.4	724.3	100.0

(1) 1962 - Fall application October 11-16  
 1963 - Fall application December 4-5

Treatments for N = November, D = December, etc.  
 all approximately 15th of month



Appendix Table No. 4

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application and Time of Nitrogen Application on the Yield of Timothy Grass Seed.  
Yields are Total Seed Yields in Pounds Per Acre by Replicate and the Average for the Four Replications.

Verne Cunningham Farm, Culver, Oregon - 1963

Fertilizer Application-Pounds/Acre			Pounds of Seed Per Acre							
P2O5	K2O	S	Nitrogen			By Replicate				Ave.
			Fall	Winter	Spring	I	II	III	IV	
0	0	0	-	-	-	178.48	189.32	252.70	249.37	217.5
0	80	80	150	-	-	370.30	456.20	462.04	457.03	436.4
80	0	80	150	-	-	366.96	389.48	716.41	571.29	511.0
80	80	0	150	-	-	466.21	541.27	739.76	633.01	595.1
80	80	80	150	-	-	276.89	447.02	463.70	728.08	478.9
80	80	80	100	-	50	244.36	256.04	409.49	468.71	344.6
80	80	80	50	-	100	296.90	403.66	360.29	562.12	405.7
80	80	80	-	-	150	518.75	427.01	471.21	429.51	461.6
80	80	80	-	D 150	-	386.98	434.51	337.77	463.70	405.7
80	80	80	-	J 150	-	569.62	467.87	280.22	388.64	426.6
80	80	80	-	F 150	-	388.64	418.67	496.23	677.21	495.2
80	80	80	-	-	-	278.56	181.81	315.25	236.86	253.1
80	80	80	75	-	75	536.26	411.16	422.84	399.49	442.4

Coefficient of Variation = 23.4%

Fertilizer Application Dates:

Fall

December 4, 1962

Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

Spring

March 18, 1963

Appendix Table No. 5

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application and Time of Nitrogen Application on the Light Seed (1) of C-1 Kentucky Bluegrass. Results in Pounds Per Acre.

Leslie Ramsey, Jr. Farm, Madras, Oregon - 1963

Fertilizer Application-Pounds/Acre						Light Seed-Pounds Per Acre				
P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Nitrogen			By Replication				Ave.
			Fall	Winter	Spring	I	II	III	IV	
0	0	0	-	-	-	48.37	34.19	36.70	25.85	36.3
0	80	80	150	-	-	148.45	205.16	115.93	141.78	152.8
80	0	80	150	-	-	125.10	180.98	125.10	236.02	166.8
80	80	0	150	-	-	150.12	194.32	231.85	183.48	189.9
80	80	80	150	-	-	195.99	166.80	162.63	190.15	178.9
80	80	80	100	-	50	142.61	222.68	179.31	116.76	165.3
80	80	80	50	-	100	147.62	145.95	180.98	119.26	148.5
80	80	80	-	-	150	117.59	119.26	44.20	94.24	93.8
80	80	80	-	D 150	-	157.63	93.41	144.28	145.95	135.3
80	80	80	-	J 150	-	160.13	200.16	187.65	103.42	162.8
80	80	80	-	F 150	-	35.03	25.02	69.22	75.89	51.3
80	80	80	-	-	-	15.01	40.87	45.87	35.03	34.2
80	80	80	75	-	75	168.47	100.08	114.26	122.60	126.1

#### Fertilizer Application Dates

##### Fall

December 5, 1962

##### Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

##### Spring

March 18, 1963

(1) The Bushel Weights of all treatments -- 14 pounds.

Appendix Table No. 6

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application and Time of Nitrogen Application on the Yield of C-1 Kentucky Bluegrass Seed Yields. Yields are in Pounds Per Acre for Replicate and Average.

Leslie Ramsey, Jr. Farm, Madras, Oregon - 1963

Fertilizer Application-Pounds/Acre						Seed Yields-Pounds Per Acre				
P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Nitrogen			By Replicate				Ave.
			Fall	Winter	Spring	I	II	III	IV	
0	0	0	-	-	-	109.25	138.44	102.58	61.72	103.0
0	80	80	150	-	-	612.16	511.24	631.34	700.56	613.8
80	0	80	150	-	-	596.31	785.63	493.73	624.67	625.1
80	80	0	150	-	-	688.05	634.67	404.49	440.35	541.9
80	80	80	150	-	-	758.11	699.73	617.16	822.32	724.3
80	80	80	100	-	50	656.36	785.63	658.03	504.57	651.1
80	80	80	50	-	100	617.16	575.46	521.25	642.18	589.0
80	80	80	-	-	150	548.77	545.44	242.69	447.02	446.0
80	80	80	-	D 150	-	561.28	438.68	654.69	626.33	570.2
80	80	80	-	J 150	-	552.94	565.45	564.62	559.61	560.7
80	80	80	-	F 150	-	308.58	283.56	400.32	418.67	352.8
80	80	80	-	-	-	46.70	145.95	117.59	156.79	116.8
80	80	80	75	-	75	567.95	472.04	441.19	522.08	500.8

Bushel Weight - All lots 27.50 pounds

#### Fertilizer Application Dates

##### Fall

December 5, 1962

##### Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

##### Spring

March 18, 1963

Appendix Table No. 7

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application  
and Time of Nitrogen Application on the Light Seed of Kentucky Bluegrass.  
Results Expressed in Pounds Per Acre.

Everett Cloud Ranch, Culver, Oregon - 1963

Fertilizer Application-Pounds/Acre						Light Seed-Pounds Per Acre				
P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Nitrogen			By Replicate				Ave.
			Fall	Winter	Spring	I	II	III	IV	
0	0	0	-	-	-	14.18	10.84	20.85	15.85	15.4
0	80	80	150	-	-	84.23	80.90	103.42	117.59	96.5
80	0	80	150	-	-	130.94	122.60	125.10	80.06	114.7
80	80	0	150	-	-	120.10	107.59	92.57	111.76	108.0
80	80	80	150	-	-	72.56	125.10	112.59	116.76	106.8
80	80	80	100	-	50	115.09	117.59	86.74	139.28	114.7
80	80	80	50	-	100	104.25	83.40	102.58	77.56	92.0
80	80	80	-	-	150	85.07	68.39	82.57	45.87	70.5
80	80	80	-	D 150	-	104.25	77.56	83.40	61.72	81.7
80	80	80	-	J 150	-	82.57	88.40	97.58	90.91	89.9
80	80	80	-	F 150	-	116.76	92.57	85.90	97.58	98.2
80	80	80	-	-	-	30.86	16.68	10.84	24.19	20.6
80	80	80	75	-	75	96.74	85.07	101.75	110.92	98.6

Bushel Weight on all Lots = 12 pounds.

Fertilizer Application Dates:

Fall

December 5, 1962

Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

Spring

March 18, 1963

Appendix Table No. 8

The Effect of Phosphate, Potash, Sulfur and Nitrogen Fertilizer Application and Time of Nitrogen Application on the Yield of Kentucky Bluegrass Seed Yields. Yields are in Pounds Per Acre for Replicate and Average.

Everett Cloud Farm, Culver, Oregon - 1963

Fertilizer Application-Pounds/Acre						Seed Yield-Pounds Per Acre				
P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Nitrogen			By Replicate				Ave.
			Fall	Winter	Spring	I	II	III	IV	
0	0	0	-	-	-	82.57	31.69	99.25	60.05	68.4
0	80	80	150	-	-	676.37	650.52	683.05	577.96	647.0
80	0	80	150	-	-	582.13	669.70	629.67	458.70	585.1
80	80	0	150	-	-	825.66	664.70	823.16	798.97	778.1
80	80	80	150	-	-	674.71	766.45	589.64	694.72	681.4
80	80	80	100	-	50	738.09	778.12	504.57	589.64	652.6
80	80	80	50	-	100	675.54	620.50	543.77	403.66	560.9
80	80	80	-	-	150	364.46	277.72	380.30	216.84	309.8
80	80	80	-	D 150	-	644.68	373.63	628.00	548.77*	548.8
80	80	80	-	J 150	-	698.89	649.70	562.12	527.92	609.7
80	80	80	-	F 150	-	773.12	538.76	662.20	497.90	618.0
80	80	80	-	-	-	66.72	78.40	41.70	109.25	74.0
80	80	80	75	-	75	696.39	746.43	594.64	684.71	680.5

Coefficient of Variation = 16.1%

\*Corrected Yield

Bushel Weight on all lots - 27 pounds

Fertilizer Application Dates

Fall

December 5, 1962

Winter

D = December 17, 1962

J = January 16, 1963

F = February 18, 1963

Spring

March 18, 1963