

GRASS SEED FERTILITY SECTION

The grass seed fertility experiment of 1961 was planned to gain further information on the requirement of phosphate, potash and sulfur at a constant relatively high rate of nitrogen.

The experiment was composed of three locations. A different variety of grass grew at each location. The varieties and locations were as follows:

Merion Kentucky Bluegrass - Louis Olsen Farm
Newport Kentucky Bluegrass - W.D. Collins Farm
Timothy - E. L. Griswold Farm

The Merion Kentucky Bluegrass location on the Louis Olsen farm had the following cropping history:

1956 - Radish Seed
1957 - Wheat, 60-80 lbs. N.
1958 - Merion Seeded
1959 - Merion, 150 lb. N, 80 lb. P₂O₅, 60 lb. K₂O
500 lbs. Clean Seed
1960 - Merion, 150 lb. N, 80 lb. P₂O₅, 60 lb. K₂O
400 lbs. Clean Seed

The legal description of the approximate site of this location is NE $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Sec. 28, R 13 E, T9S. This is approximately 10 miles northwest of Madras, Oregon.

The soil is a Madras loam and the soil test values (Appendix Table No. 1) indicate approximately average values for the elements tested.

The results by treatment are shown in Table No. 1. The average yield of all treatments was approximately 300 pounds of seed per acre of normal seed (20 lb. bu. wt.) and about 90 lb. per acre of light seed. In order to place the treatments on an equivalent basis, the seed is separated at the 20 lb. bu. wt. level. When this was done, the light seed bushel weight for each treatment was 9 pounds per bushel. The treatment yields by replicate are presented in Appendix Table No. 2.

The results obtained are more readily observed by the following breakdown.

MAIN EFFECTS

Average Seed Yield pound per acre

	Treatment	No Treatment
Sulfur	306.6	295.3
Phosphate	314.5	287.4
Potsh	294.3	307.6

Table No. 1

Effect of Fertilizer Application on Seed Yield and Light Seed Yield
of Merion Kentucky Bluegrass on the
Louis Olsen Farm, Madras, Oregon - 1961

Fertilizer Application Pounds Per Acre				Mean (1) Seed Yield Pds./Acre	Mean (2) Light Seed Pds./Acre
N	S	P ₂ O ₅	K ₂ O		
160	0	0	0	287.9	78.4
160	80	0	0	282.1	85.3
160	0	120	0	303.2	91.3
160	0	0	120	271.1	81.7
160	80	120	0	340.9	109.3
160	80	0	120	281.1	84.2
160	0	120	120	305.1	78.0
160	80	120	120	289.4	84.3
160	40	0	0	286.5	77.8
160	0	60	0	310.5	106.6
160	0	0	60	281.9	84.7
160	40	60	0	351.7	102.0
160	40	0	60	310.5	88.6
160	0	60	60	311.1	95.1
160	40	60	60	304.4	79.6
160	0	0	0	297.7	104.5

L.S.D. @ 5% - 38.5

Coefficient of Variation - 9%

Fertilizer Applied: Dec. 10, 1960

Harvested: July 13, 1961

- (1) All treatment yields adjusted to a bushel weight of 20 pounds per bushel.
- (2) The bushel weight of all light seed separations was approximately 9 pounds per bushel.

Sulfur--Phosphate Interaction

		<u>Phosphate</u>		
		-	0	60
<u>Sulfur</u>	0	292.4	310.5	
	40	286.5	351.7	

Three levels of sulfur, phosphate and potash were used in the experiment. The levels were 0, 40 and 80 pounds per acre for sulfur and 0, 60 and 120 pounds per acre for the phosphate and potash. In calculating the main effects, all treatments containing an element were averaged and compared with the average of all treatments not containing the element. It may be observed from the main effects that only phosphate appreciably increased yield. There was possibly a slight increase from sulfur and a slight decrease in yield from the application of potash. Actually, a strong sulfur-phosphate interaction distorts the value of the main effects at this location.

The principal response was the sulfur-phosphate interaction. The interaction shown is at the low level of phosphate and sulfur application. The interaction was highly significant at both levels, however the yield increase was greater at the low level. There was a 59 pound increase in seed yield due to the interaction.

Under the environment of 1961, there was no advantage of applying sulfur, phosphate or potash at the 80 and 120 pound levels, respectively, at the 160 pound N level. The average yield of the low fertility levels was 308 pounds of seed as compared to 296 pounds of seed for the high levels of these three fertilizers.

Yields by replicate are shown in Appendix Table No. 2.

The Newport Kentucky Bluegrass location was on the farm of W. D. Collins in the Little Agency Plains district, west of Madras, Oregon. The soil at this location was either a Madras loam or Madras Sandy loam. The approximate legal description for the location is S.E. $\frac{1}{4}$ of the S.W. $\frac{1}{4}$, Sec. 4, R 13 E, T 11S.

The location had the following cropping history. The area had been in chewing fescue five years prior to 1960. The fescue received approximately 100-120 lbs. N, 80 lbs. P₂O₅ and 60 lbs. K₂O annually and yielded 400-600 pounds of clean seed annually. Newport was seeded in August, 1960, and received 80 lbs. of N. as ammonium sulphate and 70 lbs. of P₂O₅ as super phosphate.

The soil test values are shown in Appendix Table No. 3. They are average values for this soil type.

The fertilizer rates applied and yields obtained are shown in Table No. 2. At the time the experimental fertilizers were applied, it was not realized that the farmer had applied between 125-150 pounds of sulfur in the nitrogen and phosphate fertilizer. Consequently, the only true variable was that of potash and little or no response to potash has been observed in grass seed production in

Table No. 2

Effect of Fertilizer Application on Seed Yield, Light Seed and
Bushel Weight of Newport Kentucky Bluegrass on the
W. D. Collins Farm, Madras, Oregon
1961

Fertilizer Application Pounds Per Acre				Mean Seed ⁽¹⁾ Yield Pds./Acre	Light Seed Pds./Acre	Bushel Wt. Light Seed
N	P ₂ O ₅	K ₂ O	S ⁽²⁾			
160	70	0	0	991.3	138.4	11.25
160	70	0	80	1000.5	175.6	11.75
160	120	0	0	1055.5	120.5	11.50
160	70	120	0	997.5	145.8	11.50
160	120	0	80	952.3	110.9	10.75
160	70	120	80	1006.0	125.8	11.25
160	120	120	0	1062.5	147.2	11.50
160	120	120	80	927.8	122.2	11.00
160	70	0	40	1030.8	108.7	10.50
160	70	0	0	946.3	120.5	10.25
160	70	60	0	925.8	110.9	13.00
160	70	60	40	1034.3	145.5	12.50

L.S.D. @ 5% N.S.

Coefficient of Variation - 13.7%

Fertilizer Applied: December 28, 1960

Crop Harvested: July 11, 1961

- (1) Bushel Weight of normal seed adjusted to 21 lbs. per bushel.
(2) In excess of 100 lbs. Sulfur was applied by the farmer in ammonium sulphate and single super-phosphate.

Jefferson County. Certainly no potash response would be expected at this location from the soil potash level as indicated by the soil test.

The yield by replication is presented in Appendix Table No. 4.

The Timothy seed location was on the E. L. Griswold Farm in the Cloverdale community in Deschutes county. The legal description of this location is as follows: SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ R 11E, T 15S. The location is approximately 15 miles west of Redmond. The soil type is described in the Deschutes Area Survey as a Deschutes course sandy loam. The soil test values for this location are presented in Appendix Table No. 5. In general the soil test indicates a low level of fertility.

This location gave a remarkable response to fertilization with sulfur, phosphate and to a lesser extent, potash. Unfortunately, from one third to one half of the seed was lost immediately before harvest to a violent summer windstorm.

A summary of the results obtained are presented in Table No. 3. The seed yields are inconclusive because of the shatter loss. The loss was extremely variable between replicates. This variability is clearly shown in the Appendix Table No. 6. Sulfur, phosphate and potash each contributed to the yield. However, sulfur and phosphate appeared to contribute most. The increase was shown by an increase in forage as well as seed. Many-fold increases in forage were obtained (by estimate) when the nitrogen alone treatment was compared to the N, S, P, treatment or N, S, P, K, treatment. With the nitrogen constant at the 160 pound level, there appeared to be no advantage in going above the 40 pound S, 60 pound PK level.

Table No. 3

Effect of Fertilizer Application on Average Seed Yield in Pounds per Acre, Bushel Weight and Plant Height, of Timothy on the E. L. Griswold Farm, Cloverdale, Oregon - 1961

Fertilizer Application Pounds Per Acre				Average Seed Yield Pds./Acre	Average Bushel Weight	Average Plant Ht. in Inches
N	S	P ₂ O ₅	K ₂ O			
160	0	0	0	132.8 ⁽¹⁾	52.50	33.5
160	80	0	0	400.3	51.50	43.0
160	0	120	0	357.0	53.00	42.0
160	0	0	120	287.0	53.00	48.0
160	80	120	0	397.3	52.50	44.5
160	80	0	120	356.8	52.00	46.0
160	0	120	120	414.8	51.25	50.0
160	80	120	120	417.8	53.00	44.0
160	40	0	0	421.0	53.00	44.0
160	0	60	0	370.8	53.00	45.5
160	0	0	60	287.0	53.00	45.0
160	40	60	0	440.5	51.00	48.0
160	40	0	60	430.8	51.50	45.0
160	0	60	60	374.0	52.50	44.5
160	40	60	60	434.0	50.75	45.5
0	0	0	0	181.0	51.50	43.0

L.S.P. @ 5%

NS

Coefficient of Variation - 37.96

Fertilizer Applied: Dec. 14, 1960

Harvested: September 5, 1961

(1) Yields were probably reduced 1/3 to 1/2 by windstorm immediately prior to harvest.

Appendix Table No. 1Soil Test Values of the Grass Seed Fertility Experiment
Louis Olsen Location - 1961

Soil Depth Inches	pH	P ppm	Me/100 gms. Soil			B ppm	Org. Mat. %
			K	Ca	Mg		
0-8	7.1	14.50	1.43	9.4	4.8	.8	1.16
8-16	7.6	7.50	1.04	9.7	7.0	.64	.91
16-24	7.9	7.25	1.23	13.9	10.2	.5	.88

Effect of Fertilizer Application on Seed Yield
of Merion Kentucky Bluegrass
Yield Presented by Replicate and Mean of Four Replications
Louis Olsen Farm, Madras, Oregon - 1961

Fertilizer Application Pounds per Acre				Seed Yield - Pounds per Acre By Replicate				Mean Seed Yield
N	S	P ₂ O ₅	K ₂ O	I	II	III	IV	
160	0 1	0	0	336.9	248.5	263.5	302.7	287.9
160	80 5	0	0	273.6	323.6	378.6	247.7	282.1
160	0 3	120	0	309.4	325.3	283.6	294.4	303.2
160	0 2	0	120	376.1	261.9	283.6	262.7	271.1
160	80 7	120	0	375.3	337.8	308.6	341.9	340.9
160	80 6	0	120	379.4	300.2	266.9	277.7	281.1
160	0 4	120	120	396.1	276.9	350.3	296.9	305.1
160	80 8	120	120	359.4	311.9	295.2	291.1	289.4
160	40 5	0	0	298.6	261.9	280.2	305.2	286.5
160	0 2	60	0	269.4	358.6	291.1	322.8	310.5
160	0 2	0	60	396.9	312.8	246.0	271.9	281.9
160	40 7	60	0	319.4	383.6	336.1	367.8	351.7
160	40 6	0	60	311.1	296.1	296.1	338.6	310.5
160	0 4	60	60	292.7	270.2	332.8	348.6	311.1
160	40 2	60	60	295.2	291.9	296.9	333.6	304.4
160	0 1	0	0	310.2	306.9	260.2	313.6	297.7

L.S.D. @ 5%
Coefficient of Variation - 9.0%

38.5.

Fertilizers Applied - Dec. 10, 1960
Harvested - July 13, 1961

Appendix Table No. 3

Soil Test Values of the Grass Seed Fertility Experiment
William Collins Farm - 1961

Soil Depth Inches	pH	ppm	Me/100 gms. Soil			ppm	Org. Mat.
			K	Ca	Mg		
0-8	6.2	13.75	1.46	10.8	6.8	.62	1.70
8-16	6.6	9.00	1.31	12.4	8.4	.68	1.14
16-24	7.6	5.50	.98	21.0	13.4	.42	.79

Appendix Table No. 4

Effect of Fertilizer Application on Seed Yield
of Newport Kentucky Bluegrass
Yield Presented by Replicate and Mean of Four Replications

W. D. Collins Farm, Madras, Oregon, 1961

Fertilizer Application Pounds per Acre				Seed Yield - Pounds per Acre By Replicate				Mean Seed Yield
N	P ₂ O ₅	K ₂ O	S	I	II	III	IV	
160	70	0	0	1209	866	992	898	991.3
160	70	0	80	1193	1048	887	874	1000.5
160	120	0	0	1299	786	997	1140	1055.5
160	70	120	0	1151	973	991	875	997.5
160	120	0	80	895	922	913	1079	952.3
160	70	120	80	941	1101	737	1245	1006.0
160	120	120	0	1121	1085	983	1061	1062.5
160	120	120	80	998	919	610	1184	927.8
160	70	0	40	1093	1113	857	1060	1030.8
160	70	0	0	940	880	994	971	946.3
160	70	60	0	781	914	938	1070	925.8
160	70	60	40	1158	1022	1017	940	1034.3

L.S.D. @ 5%
Coefficient of Variation - 13.7%

Fertilizer Applied - Dec. 28, 1960
Harvested: July 11, 1961

Appendix Table No. 5

Soil Test Values of the Grass Seed Fertility Experiment
E. L. Griswold Location - 1961

Soil Depth Inches	pH	P ppm	Me/100 gms. Soil			B ppm	Org. Mat. %
			K	Ca	Mg		
0-8	6.1	5.00	.46	4.5	1.4	.22	2.01
8-16	6.2	4.75	.50	4.5	1.45	.22	.88
16-24	6.4	6.25	.52	3.9	1.45	.22	.42

Appendix Table No. 6

Effect of Fertilizer Application on Seed Yield of Timothy
Yield Presented by Replicate and Mean of Four Replications
E. L. Griswold Farm, Cloverdale, Oregon - 1961

Fertilizer Application Pounds per Acre				Seed Yield - Pounds per Acre By Replicate				Mean Seed Yield
N	S	P ₂ O ₅	K ₂ O	I	II	III	IV	
160	0	0	0	195	123	152	61	132.8
160	80	0	0	532	550	334	185	400.3
160	0	120	0	588	188	348	304	357.0
160	0	0	120	525	239	219	165	287.0
160	80	120	0	357	355	338	539	397.3
160	80	0	120	437	273	379	338	356.8
160	0	120	120	340	572	253	494	411.8
160	80	120	120	420	327	488	436	417.8
160	40	0	0	319	546	232	587	421.0
160	0	60	0	440	214	435	394	370.8
160	0	0	60	292	220	455	181	287.0
160	40	60	0	327	328	495	612	440.5
160	40	0	60	329	520	269	605	430.8
160	0	60	60	294	556	204	442	374.0
160	40	60	60	268	515	574	379	434.0
0	0	0	0	184	226	250	64	181.0