

Cawson

RANGE

LOCKEFORD PLANT MATERIALS CENTER
U.S.D.A. SOIL CONSERVATION SERVICE

1975 ANNUAL TECHNICAL REPORT

BLACK BUTTE FIELD EVALUATION PLANTING

The Black Butte Field Evaluation Planting represents a specific problem area in the foothills west of the Sacramento Valley (MLRA 15). The area is characterized by low natural fertility, low available water holding capacity of the soils, sloping land, and poor rainfall distribution. Characteristic soil series are Altamont and Newville. The objectives of the range improvement studies, being carried on in conjunction with the Agricultural Extension Service, are to provide earlier winter forage, provide improved mid-winter forage, improve management practices on rangeland, and find forage that will cure well for standing hay for late summer and early fall feeding.

During 1973-74, four trials were continued from previous years, one trial was discontinued, and one new study was implemented. Also added during the year was a range plant demonstration plot. The trial which was testing the effect of Simazine on perennial grass establishment was abandoned due to insufficient stand and subsequent poor yields.

ADAPTATION AND PERFORMANCE OF FORAGE GRASSES AND LEGUMES

1972-73 Seeding - 3rd Year Data

Due to insufficient stand of the perennial grasses in this study, it was discontinued after the initial plant counts and clippings indicated inadequate information. The plots will be observed as a longevity study for the few established perennials.

IMPROVEMENT OF ANNUAL RANGE WITH ANNUAL LEGUMES

Work by Jones (1967) and other authors has demonstrated that California annual range seeded to subterranean clover gives substantial amounts of high protein forage, equivalent to as much as annual range fertilized with 85-200 pounds per acre nitrogen. Furthermore, as the season advances, protein values decline more in fertilized range than in areas seeded to subclover (unfertilized).

Much of this work has been conducted at the Hopland Field Station where rainfall is considerably higher than along the western Sacramento Valley. To ascertain the effect subclover and two other legumes (rose clover and medic) had on the yield and quality of forage in drier areas, trials were implemented at Black Butte in fall, 1973.

Procedure - On October 15, 1973, two plot areas 38' x 44' were marked off on Altamont clay and Newville gravelly loam. All vegetation to two inches was removed by beating with a rake leaving a patchy appearance. All plots to be seeded were cultivated with a hand rototiller creating a trashy seedbed. The following plots were established and replicated three times:

1. Subclover mixture (Geraldton, Woogenellup, Mt. Barker) seeded at 20 lbs/Ac, fertilized with 300 lbs/Ac single superphosphate.
2. Rose clover mixture (Wilton, Hykon, Kondinin) seeded at 20 lbs/Ac, fertilized with 300 lbs/Ac single superphosphate.
3. Barrel medic mixture (Jemalong, Harbinger) seeded at 20 lbs/Ac, fertilized with 300 lbs/Ac single superphosphate.
4. Annual range fertilized with 300 lbs/Ac 16-20-0.
5. Unfertilized annual range.

Seed and fertilizer were hand broadcast and then covered with a heavy chain. One foot strips between plots were sterilized with Simazine.

1974-75 Results - This is the second year clipping data. All plots were clipped to a two-inch stubble height on 2/3/75, 3/5/75, 4/3/75, 5/5/75, and 6/5/75. Samples from 40 square feet of each plot were taken on each date. The samples were air dried, weighed for production, and sent to the Agricultural Extension Service Laboratory at Davis to be analyzed for protein content.

On the Newville soil, the best production was obtained from the rose clover plot with 815 lbs. of air dry forage per acre. The poorest production resulted from the unfertilized range, although it was comparable to the plot for fertilized range which was fertilized in the previous year. This production was 532 lbs. for unfertilized and 534 lbs. for fertilized.

On the Altamont soil, the best production was obtained from the subclover plot with 1742 lbs. of air dry forage per acre. The medics had slightly poorer production than the fertilized and unfertilized annual range plots.

The laboratory report on the protein percentages for these plots had not been completed by the time this report was published. The information will be presented in next years technical report.

For more detailed information on production, see Tables 1 and 2.

Discussion - Overall production was poor this year, when compared to last year. The dry fall was probably one factor which influenced the production. Another reason for part of the decline in production was that the plots received no supplemental fertilizer before the growing season. One final factor which contributed to poorer production was the method of harvesting the 40 ft.² plots. On some harvests the mower left part of the clippings behind on the ground, and caught up in the mowing equipment. Care will be taken next year to prevent the loss of production from this problem.

Protein Analysis for the 1973-74 Clipping - In last years report, the protein analysis for the 1973-74 clippings was not back from the laboratory at the time the report was published. That information is presented here.

On the Newville soil, the percentage of protein was best on the fertilized range plot with 315 lbs. of crude protein per acre. It was poorest on the medic plot with only 105 lbs. per acre. The fertilized range plot produced more than twice the protein of any of the other plots in the first year. See Table 3 for more data.

On the Altamont soil, once again, the fertilized annual range plot produced the most crude protein, with 346 lbs. per acre. However, the rose clover plot with 333 lbs. per acre, and the subclover plot with 283 lbs. per acre were close behind in first year production of crude protein. The medics also showed the poorest protein production once again with 189 lbs. crude protein per acre. See Table 4 for more complete data.

Lana Vetch Fertilization Trial - 2nd Year Data

Work at the Sunol FEP (1959-63) indicates high production and stands of Lana vetch when fertilized with 200 pounds per acre single superphosphate or ammonium phosphate sulfate. Other reports from field plantings indicate that single superphosphate increases percent composition of Lana, thereby increasing forage quality.

Fertilizer plots were established in fall, 1973 on Altamont clay to ascertain response of Lana vetch to S, PS, and NS in forage production and quality (percent N) over a three year period.

Procedure - On October 15, 1973, a 10' x 360' area was disced creating a slightly trashy seedbed. Lana vetch was broadcast at 20 pounds per acre and covered with a harrow. The following plots (10' x 30') were established and replicated three times:

1. Check
2. 100 pounds/acre S (elemental sulfur)
3. 60 pounds/acre P, 36 pounds/acre S (single superphosphate)
4. 31.5 pounds/acre N, 36 pounds/acre S (ammonium sulfate)

Plots were clipped on June 18, 1974 to a two inch stubble. Samples from 40 feet square were air dried, weighed and tested for percent N. All remaining clippings were removed from the plots. This same clipping procedure was done on June 5, 1975.

Results - 2nd Year Data - The 1974 results were summarized in last years report. This year, the yield from all treatments was considerably less than from yields of 1974. The plots fertilized with 21-0-0-24 had the best production overall, but the composition was mainly grass, as this treatment had the least amount of Lana vetch in the plots. The plots fertilized with single superphosphate had the next best production. Even though it had slightly less Lana vetch seedling per square foot in February, it still out produced the sulfur and check plot. The lower production for the year can be attributed to the same factors as discussed in the annual legume versus native range section preceding this section. Refer to Table 5 for more complete information.

OTHER STUDIES

A new study was initiated to determine new establishment techniques for perennial grasses on difficult soils. The procedure involved spring versus fall planting using different herbicides as pretreatment to the soil. Preliminary results show all these plots to be failures with little or no perennial grass establishment. This trial will therefore be discontinued.

The data from the annual legume seeding rate trial and the annual legume fertilization trial is being kept by the Agricultural Extension Service. A summary of these studies will be included in the Technical Report as they are completed.

A range plant demonstration trial was installed in the fall of 1974. Included in the demonstration were 24 annual legumes, two annual grasses, and 10 perennial grasses. The annual legumes and grasses all established to some degree during the first growing season. The perennial grasses failed to establish, and will be replanted next year.

TABLE 1. SECOND YEAR PRODUCTION COMPARISON OF ANNUAL LEGUMES VS. ANNUAL RANGE - NEWVILLE SOIL
1975 ANNUAL TECHNICAL REPORT

TREATMENT Plot (Specie)	Rep	HARVEST DATES					Total Yield Plot Per Acre <u>3/</u>
		(1)2-3-75 Yield <u>1/</u>	(2)3-5-75 Yield <u>1/</u>	(3)4-3-75 Yield <u>1/</u>	(4)5-5-75 Yield <u>1/</u> %Legume <u>2/</u>	(5)6-5-75 Yield	
NR 1 (Rose clover)	I	.005	.04	.16	.59	70	.915
	II	.02	.03	.15	.51	70	.780
	III	0	.03	.18	.25	25	.550
	Average	.008	.033	.163	.450	55	.748
NR 2 (Sub clover)	I	.005	.05	.16	.29	80	.535
	II	.005	.06	.14	.35	70	.645
	III	.07	.06	.22	.18	90	.620
	Average	.026	.056	.173	.273	80	.600
NR 3 (Medics)	I	.005	.04	.14	.38	15	.625
	II	.02	.03	.14	.48	25	.670
	III	.01	.05	.22	.40	15	.750
	Average	.012	.043	.166	.420	18	.682
NR 1 (Fertilized range)	I	.005	.01	.08	.42	-	.55
	II	0	.02	.08	.28	-	.440
	III	.01	.02	.07	.29	-	.450
	Average	.005	.016	.076	.330	-	.489
NR 2 (Unfertilized range)	I	.005	.02	.09	.34	-	.515
	II	.02	.02	.10	.31	-	.480
	III	0	.02	.06	.31	-	.470
	Average	.008	.02	.083	.32	-	.488

1/ This figure represents the air dry weight in pounds from a 40 ft.² clipping. To convert to pounds per acre, multiply by 1089.

2/ Visual estimate

3/ Converted pounds/acre for this years growing season.

TABLE 2. SECOND YEAR PRODUCTION COMPARISON OF ANNUAL LEGUMES VS. ANNUAL RANGE - ALTAMONT SOIL
1975 ANNUAL TECHNICAL REPORT

TREATMENT Plot (Specie)	Rep	HARVEST DATES					Total Yield Plot Per acre ^{3/}
		(1)2-3-75 Yield <u>1/</u>	(2)3-5-75 Yield <u>1/</u>	(3)4-3-75 Yield <u>1/</u>	(4)5-5-75 Yield <u>1/</u> %Legume <u>2/</u>	(5)6-5-75 Yield <u>1/</u>	
AM 1 (Rose clover)	I	.14	.19	.39	.74	.14	1.60
	II	.15	.13	.33	1.03	.21	1.85
	III	.05	.06	.34	.74	.09	1.28
	Average	.113	.127	.353	.837	.147	1.58
AM 2 (Sub clover)	I	.11	.14	.40	.78	.16	1.59
	II	.03	.10	.54	.64	.18	1.49
	III	.27	.16	.42	.64	.23	1.72
	Average	.137	.133	.453	.687	.190	1.60
AM 3 (Medics)	I	.08	.08	.34	.66	.13	1.29
	II	.04	.08	.16	.52	.15	.95
	III	.04	.15	.20	.50	.25	1.14
	Average	.053	.103	.233	.560	.177	1.13
AR 1 (Fertilized range)	I	.19	.14	.24	.65	.29	1.51
	II	.08	.15	.16	.53	.30	1.23
	III	.04	.06	.12	.59	.26	1.07
	Average	.103	.117	.173	.590	.283	1.27
AR 2 (Unfertilized range)	I	.12	.14	.26	.56	.19	1.27
	II	.11	.10	.21	.47	.24	1.13
	III	.07	.08	.14	.42	.32	1.03
	Average	.100	.107	.203	.483	.250	1.14

^{1/} This figure represents the air dry weight in pounds from a 40 ft. ² clipping. To convert to pounds per acre, multiply by 1089.

^{2/} Visual estimate

^{3/} Converted pounds/acre for this years growing season.

TABLE 3. CRUDE PROTEIN COMPARISON OF ANNUAL CLOVERS VERSUS NATIVE ANNUAL RANGE - 1st YEAR DATA
NEWVILLE SOIL - 1975 ANNUAL TECHNICAL REPORT

Species	Rep	1/11/74		3/27/74		6/19/74		Average Crude Protein Per Acre
		Yield 1/	% Protein 2/	Yield 1/	% Protein	Yield 1/	% Protein	
Rose clover M1	I	-	-	98	19.1	2777	5.2	
	II	-	-	44	16.8	2363	4.6	
	III	-	-	44	16.8	2290	3.1	
	Average	-	-	62	17.6	2447	4.3	115 lb.
Sib clover M2	I	-	-	87	-	2592	5.6	
	II	-	-	22	12.9	2287	4.3	
	III	-	-	174	14.4	2395	5.0	
	Average	-	-	94	13.7	2425	5.0	134 lb.
Medics M3	I	-	-	44	15.8	1775	4.5	
	II	-	-	65	15.2	2625	4.1	
	III	-	-	131	13.0	2396	3.6	
	Average	-	-	80	14.7	2265	4.1	105 lb.
Fertilized R1	I	381	19.8	730	13.8	2951	4.4	
	II	474	17.6	359	15.2	4334	3.9	
	III	457	19.1	632	12.2	2766	5.8	
	Average	477	18.8	574	13.7	3350	4.7	115 lb.
Unfertilized R2	I	283	8.6	-	-	2233	4.6	
	II	218	8.7	-	-	4052	12.6*	
	III	305	7.2	-	-	1775	3.2	
	Average	269	8.2	-	-	2690	3.9	127 lb.

1/ In pound per acre
2/ From University lab analysis
* Probably error in calculation

TABLE 4. CRUDE PROTEIN COMPARISON OF ANNUAL CLOVERS VERSUS NATIVE ANNUAL RANGE - 1st YEAR DATA
 ALTAMONT SOIL - 1975 ANNUAL TECHNICAL REPORT

Species	Rep	Protein Analysis Dates						Average Crude Protein Per Acre
		1/11/74	2/8/74	3/27/74	6/19/74	Yield 1/ %Protein	Yield 1/ %Protein	
Rose clover	I	-	87	534	15.5	3169	4.2	333 lb.
	II	-	65	370	15.9	5990	7.2	
	III	-	76	425	17.4	4214	5.4	
	Average	-	76	443	16.3	4458	5.6	
Sub clover	I	-	65	414	16.4	4922	6.0	283 lb.
	II	-	55	327	18.8	3997	3.5	
	III	-	65	272	16.4	4062	5.6	
	Average	-	62	338	17.2	4327	5.0	
Medics	I	-	87	621	13.1	2341	4.6	189 lb.
	II	-	65	523	16.8	1285	2.5	
	III	-	22	414	15.1	4933	3.5	
	Average	-	58	519	15.6	2853	3.5	
Fertilized range	I	457	545	773	16.8	3855	3.9	346 lb.
	II	381	425	403	15.5	4617	3.2	
	III	359	436	621	15.2	4694	2.0	
	Average	399	469	599	15.8	4389	3.0	
Unfertilized range	I	294	163	414	13.4	4214	6.0	257 lb.
	II	218	153	316	12.6	4935	3.5	
	III	185	163	436	11.5	2897	6.1	
	Average	232	160	389	12.5	3349	5.2	

1/ In pounds per acre
 2/ From University Lab Analysis

TABLE 5. EFFECT OF THREE FERTILIZER TREATMENTS ON PRODUCTION, % NITROGEN, AND PROTEIN ANALYSIS - 2nd YEAR DATA - 1975 ANNUAL TECHNICAL REPORT

Treatment	Yield lbs/Ac		Vetch	% Protein
	1973-74	1974-75	Plants per Ft ² on 2/4/75	
1. Check	2863	1507	11.4	<u>1/</u>
2. 100 lbs/Ac Sulfur	2609	1535	9.9	<u>1/</u>
3. 60 lbs/Ac Phosphorus and 36 lbs/Ac Sulfur	4606	1742	9.4	<u>1/</u>
4. 31.5 lbs/Ac Nitrogen 36 lbs/Ac Sulfur	3169	2102	7.5	<u>1/</u>

1/ This data has not been returned from the University of California Laboratory as of this date. It will be reported in next years Technical Report.

BLACK BUTTE FIELD EVALUATION SITE
Yield and Crude Protein Values
Annual Clovers vs Range

Newville Soil - 1974

Harvest Date Treatments	1/11/74		3/27/74		6/19/74		Accumulated Yield lbs/acre
	Yield lbs/acre	CP* %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	
Rose Clover			62	17.6	2447	4.3	2509 4
Sub Clover			94	14.1	2425	5.0	2519 3
Medics			80	14.7	2265	4.1	2345 5
Fertilized Range	417	18.8	573	13.7	3350	4.7	4340 1
Unfertilized Range	269	8.2	-	-	2690	3.9	2959 2

* Crude Protein

*why
highest
summer
annuals?*

BLACK BUTTE FIELD EVALUATION SITE
 Yield and Crude Protein Values
 Annual Clovers vs Range

Altamont Soil - 1974

Harvest Date Treatments	1/11/74		2/8/74		3/27/74		6/19/74		Accumulated Yield lbs/acre
	Yield lbs/acre	CP* %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	
Rose Clover			76	14.4	443	16.2	4458	5.6	4977 ³
Sub Clover			62	14.5	338	17.2	4327	5.0	4727 ⁴
Medics			58	13.9	519	15.6	2853	3.5	3430 ⁵
Fertilized Range	399 ^{***}	13.9 ^{***}	469	15.8	599	14.1	4388	3.0	5855 ¹
Unfertilized Range	232	6.2	160	12.5	387	13.7	4015	5.2	5573 ²

* Crude Protein

BLACK BUTTE FIELD EVALUATION SITE
 Yield and Crude Protein Values
 Annual Clovers vs Range

Newville Soil - 1975

Harvest Date Treatments	2/3/75		3/5/75		4/3/75		5/5/75		6/3/75
	Yield lbs/acre	CP* %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	Yield lbs/acre
Rose Clover	16	8.0	36	13.2	178	13.4	490	10.5	102
Sub Clover	29	8.6	62	17.7	189	15.9	298	10.6	76
Medics	13	7.0	47	12.0	182	11.5	457	9.2	68
Fertilized Range	21	9.4	18	11.4	83	13.1	359	9.7	58
Unfertilized Range	18	6.9	22	11.0	91	11.3	348	9.7	62

* Crude Protein

BLACK BUTTE FIELD EVALUATION SITE
 Yield and Crude Protein Values
 Annual Clovers vs Range

Altamont Soil - 1975

Harvest Date Treatments	2/3/75		3/5/75		4/3/75		5/5/75		6/5/75		Accumulated Yield lbs/acre
	Yield lbs/acre	CP* %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	Yield lbs/acre	CP %	
Rose Clover	123	12.8	102	14.4	385	19.6	911	19.5	158	11.0	1679 <i>135</i>
Sub Clover	149	14.4	145	19.9	494	25.7	748	23.6	207	11.3	1743 <i>140</i>
Medics	58	13.6	112	12.9	254	16.5	610	17.5	192	9.2	1226 <i>199</i>
Fertilized Range	76	13.9	127	11.9	189	16.2	642	16.4	308	9.2	1342 <i>108</i>
Unfertilized Range	108	14.6	116	14.0	221	15.8	526	14.8	272	9.0	1243 <i>100</i>

7233

*Crude Protein

BLACK BUTTE FIELD EVALUATION SITE
 Yield and Crude Protein Values
 Annual Clovers vs Range

Newville Soil - 1976

Harvest Date Treatments	5/16/76		Accumulated
	Yield lbs/acre	CP* %	Yield lbs/acre
Rose Clover	769	5.0	769 ³
Sub Clover	537	6.7	537 ⁵
Medics	642	4.6	642 ⁴
Fertilized Range	1201	4.4	1201 ¹
Unfertilized Range	798	5.0	798 ²

* Crude Protein

BLACK BUTTE FIELD EVALUATION SITE
 Yield and Crude Protein Values
 Annual Clovers vs Range

Altamont Soil - 1976

Harvest Date Treatments	5/16/76		Accumulated Yield lbs/acre
	Yield lbs/acre	CP* %	
Rose Clover	1421	8.4	1421
Sub Clover	1343	8.4	1343
Medics	1118	8.0	1118
Fertilized Range	1870	7.9	1870
Unfertilized Range	1510	7.3	1510

* Crude Protein