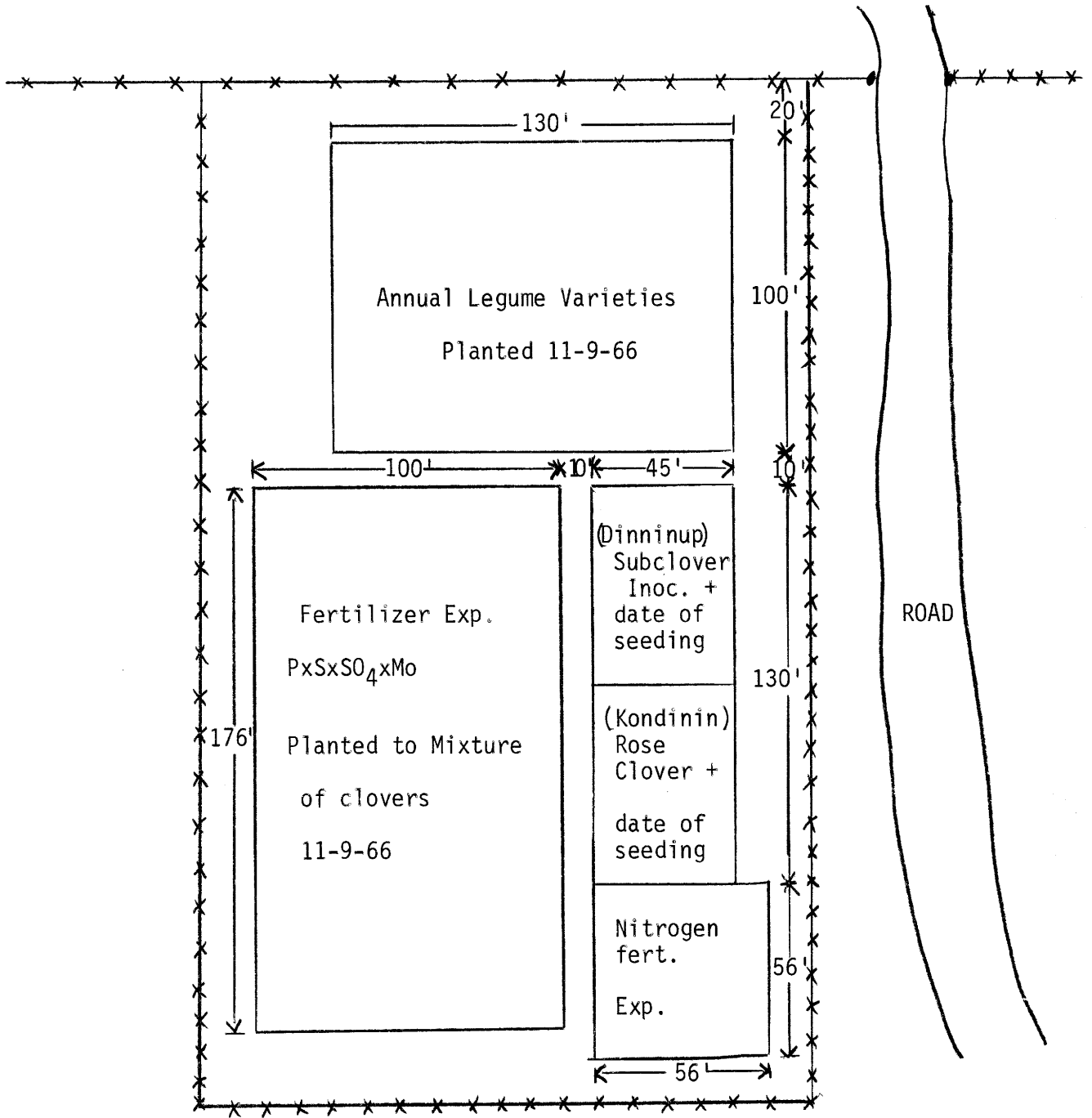
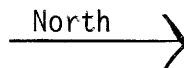


BLACK BUTTE RANCH - GLENN COUNTY
Plot Area Diagram

Newville Grv loan



Previous Crop Barley



BLACK BUTTE RANCH - GLENN COUNTY
Annual Legume Varieties

Cooperator: Dick Conway, Manager

Previous Crop: Barley

Seedbed: Disked lightly one time over grazed barley stubble

Fertilizer: 400 lbs/acre single super phosphate - ½ lb./acre sodium molybdate
sprayed on October 26, 1966

Planted: 100 lbs./acre, November 9, 1966 - rinrolled after planting

Seed pelleted with Nitrogen Co. inoculant (ux) - Sub & Rose - R type exp.

Woogenellup - ½ R + ½ W.A.Gy - Vetch - C type - Medic - A type

	20'		II	III	IV	V
↑ 10' ↓	Dinninup Sub.	Dwalganup Sub.	Mt. Barker Sub.	Dwalganup Sub.	Mt. Barker Sub.	
	Kondinin Rose	Check	Lana Vetch Early Cut	Woogenellup Sub.	Wilton Rose	
	Geraldton Sub.	Geraldton Sub.	Lana Vetch Late Cut	Yarloop Sub.	173 Barrel Medic	
	Wilton Rose	Lana Vetch Early Cut	Kondinin Rose	173 Barrel Medic	Kondinin Rose	
	Dwalganup Sub.	Lana Vetch Late Cut	Wilton Rose	Bacchus Marsh Sub.	Geraldton Sub.	
	Bacchus Marsh Sub.	Mt. Barker Sub.	Dwalganup Sub.	Wilton Rose	Lana Vetch Late Cut	
	Woogenellup Sub.	Wilton Rose	Check	Geraldton Sub.	Lana Vetch Early Cut	
	Mt. Barker Sub.	Yarloop Sub.	Woogenellup Sub.	Kondinin Rose	Woogenellup Sub.	
	Yarloop Sub.	Dinninup Sub.	Dinninup Sub.	Mt. Barker Sub.	Dinninup Sub.	
	Check	Bacchus Marsh Sub.	Yarloop Sub.	Check	Bacchus Marsh Sub.	
	Lana Vetch Late Cut	173 Barrel Medic	Bacchus Marsh Sub.	Dinninup Sub.	Yarloop Sub.	
	Lana Vetch Early Cut	Kondinin Rose	173 Barrel Medic	Lana Vetch Late Cut	Dwalganup Sub.	
	173 Barrel Medic	Woogenellup Sub.	Geraldton Sub.	Lana Vetch Early Cut	Check	

↑
North

ANNUAL LEGUME VARIETY TRIAL

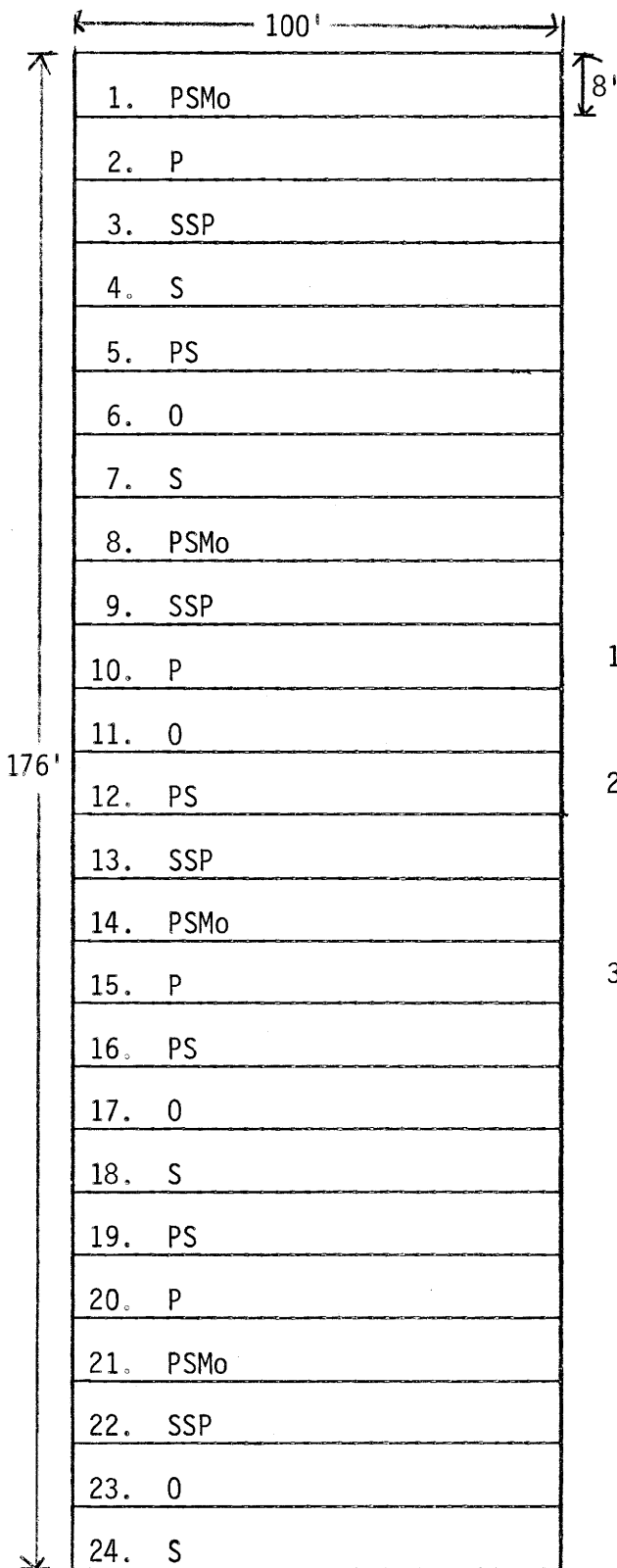
1. Seeded legumes produced two to three times more dry matter than the native plants at both harvest dates.
2. Yarloop sub clover produced the most dry matter at both cuttings.
3. Lana Vetch equaled Yarloop sub clover in early yield, but did not have as much regrowth. The Lana Vetch that was cut only once produced the highest yield, but no comparison is possible.
4. Mt. Berker sub, Wilton Rose, Woogenellup sub and Bacchus Marsh sub made the greatest late season growth proportionate to early growth.

Dry Matter Yields of Several Annual Legume Varieties

<u>Variety</u>	<u>Dry Matter yield lbs/acre 3/6/67</u>	<u>Dry Matter yield lbs/acre 5/9/67</u>	<u>Combined yield lbs/acre</u>	<u>Combined yield % of check</u>
Yarloop sub clover	1938 ^a	3842	5779 ^a	321
Kondinin rose clover	1398 ^c	3895	5293 ^b	294
Mt. Barker sub clover	1094 ^d	4189	5283 ^b	294
Dinninup sub clover	1673 ^b	3548	5220 ^b	290
173 Barrel medic	1683 ^b	3519	5201 ^b	289
Wilton rose clover	998 ^d	4111	5109 ^b	285
Woogenellup sub clover	1060 ^d	4006	5067 ^b	282
Bacchus Marsh sub clover	998 ^d	4054	5051 ^b	281
Lana vetch	1914 ^a	2868	4782 ^b	266
Lana vetch (one cutting 5-18-67)	--	(7693)	--	-
Dwalganup sub clover	935 ^d	3297	4232 ^c	235
Geraldton sub clover	1036 ^d	2883	3919 ^c	218
Check	549 ^c	1249	1798 ^d	100

a,b,c Where yields have different superscript letters, there is a 95% chance that the difference is due to the variety planted.

BLACK BUTTE RANCH - GLENN COUNTY
Sulfur & Phosphorus Experiment



North →

Area Seeded 11-9-66
Clover mixture 100 lbs/acre

		<u>N- P- K -S</u>	<u>Source</u>
PSMo	400 lbs/ac	0-40-0-20	TVA
P	410 lbs/ac	0-54-0-7	Treble super
SSP	630 lbs/ac	0-20-0-16	Single super
S	290 lbs/ac	0-0- 0-10	Gypsum
PS	330 lbs/ac	0-40-0-20	TVA

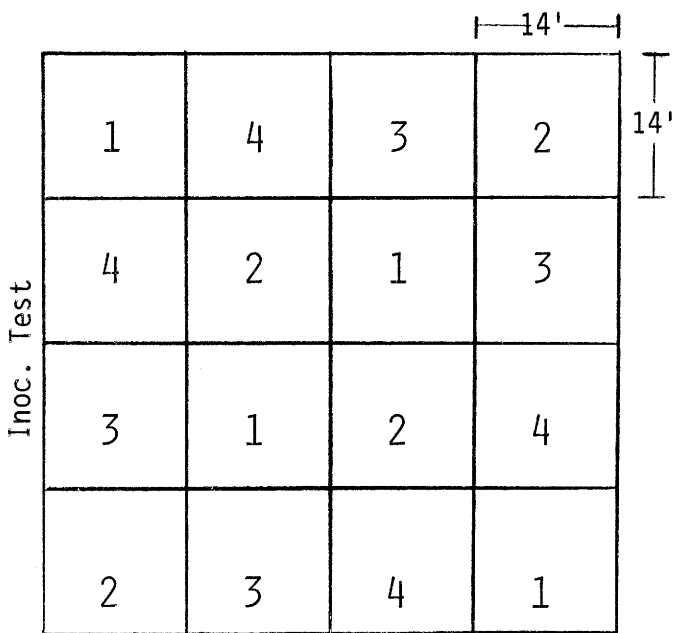
1. Sulfur alone or with phosphorus and phosphorus plus molybdenum plots yielded significantly more than the unfertilized control.
2. Phosphorus appears to be the second most limiting nutrient after sulfur. Phosphorus tended to increase yields when added to other treatments, but differences were not statistically significant at the 5% level.
3. In combination with phosphorus, sulfate sulfur or elemental sulfur plus molybdenum gave non-significant yield increases over elemental sulfur.

Dry Matter Yields of Annual Legumes Fertilized with Phosphorus, Sulfur and Molybdenum

<u>Fertilizer</u>	<u>Dry Matter yield lbs./acre 3-7-67</u>	<u>Dry Matter yield lbs/acre 5-18-67</u>	<u>Combined dry matter yields</u>	<u>Combined yield as % of check</u>
650 lbs/ac PSO_4 0-20-0-16	1711 ^a	3340	5051 ^a	125
400 lbs/ac PSMo 0-40-0-20	1693 ^a	3356	5049 ^a	125
350 lbs/ac PS 0-40-0-20	1591 ^{ab}	3258	4849 ^{ab}	120
300 lbs/ac S 0- 0-0-10	1187 ^c	3576	4763 ^{ab}	118
400 lbs/ac P 0-54-0- 0	1355 ^{bc}	2970	4394 ^{bc}	113
0	1253 ^c	2788	4041 ^c	100

^{a, b, c} Where yields have different superscript letters, there is a 95% chance that the difference is due to the fertilizer treatment.

BLACK BUTTE RANCH - GLENN COUNTY
Nitrogen Fertilizer Experiment



	N/acre	Material	Material/ Acre	Material/ Plot
1.	0	Check		
2.	40	Ammonium sulfate (21% N)	200 lbs.	1 lb.
3.	40	Calcium nitrate (15% N)	270 lbs.	1.35 lb.
4.	80	Ammonium sulfate (21% N)	400 lbs.	2 lb.

Plots seeded with 10 lb./acre of clover mixture on November 9, 1966.

1. Nitrogen depressed formation of large nodules on the crowns of Dinninup sub clover plants.
2. Ammonium sulfate affected nodulation more seriously than the same rate of nitrogen applied as calcium nitrate.
3. Competing volunteer barley was increased by nitrogen fertilization.

Effect of Nitrogen on Clover Establishment

Fertilizer Treatment	PPM NO ₃ -N in Soil	Lbs. dry matter per acre 2-14-67	% Dinninup sub clover plants with large nodules on crown
80 N/acre Ammonium sulfate	13.8	2834	35
40 N/acre Ammonium sulfate	5.0	1637	55
40 N/acre Calcium nitrate	3.4	1573	72
0 Check	3.0	1252	90

BLACK BUTTE RANCH - GLENN COUNTY
Inoculation & Data of Planting Trial

Dinninup Sub clover													Kondinin Rose clover												
5	10	12	7	4	9	1	3	2	6	11	8	13	4	9	11	6	13	8	1	3	2	5	10	7	12
6	11	13	8	2	1	3	10	5	12	7	9	4	11	6	4	9	8	13	7	12	5	10	1	3	2
7	12	11	6	8	13	1	3	2	9	4	5	10	8	13	1	3	2	11	6	7	12	5	10	4	9
11	6	2	1	3	10	5	9	4	12	7	13	8	10	5	12	7	2	1	3	11	6	4	9	13	8
9	4	1	3	2	6	11	10	5	8	13	7	12	6	11	9	4	3	1	2	5	10	13	8	12	7

	<u>Inoc. Date</u>	<u>Planting Date</u>
1. Sterile seed	None	Nov. 9
2. Peat Dust	Nov. 9	"
3. Pellet 4X	Nov. 8	"
4. "	"	Nov. 22
5. "	"	Dec. 5
6. "	"	Dec. 16
7. "	"	Jan. 12
8. "	"	"
9. "	Nov. 21	Nov. 22
10. "	Dec. 5	Dec. 5
11. "	Dec. 15	Dec. 16
12. "	Jan. 10	Jan. 12
13. "	"	"



1. Pellet inoculation was better than peat dust and peat dust better than sterile seed in all measures of inoculation effectiveness, namely visual grade, weight of plants and percent of plants with large crown nodules.
2. Inoculation is more critical for Dinninup sub compared to Kondinin rose clover.

Effect of Inoculation of Nodulation of Clover Plants

Treatment	Dinninup Sub			Kondinin Rose		
	Visual grade 2-2-67	Gms/10 plants 2-2-67	% plants with crown nodules	Visual grade 2-2-67	Gms/10 plants 2-2-67	% plants with crown nodules
Sterile seed	21	.122	48	26	.090	32
Peat dust	39	.164	54	40	.108	44
Pellet	60	.254	92	44	.142	88

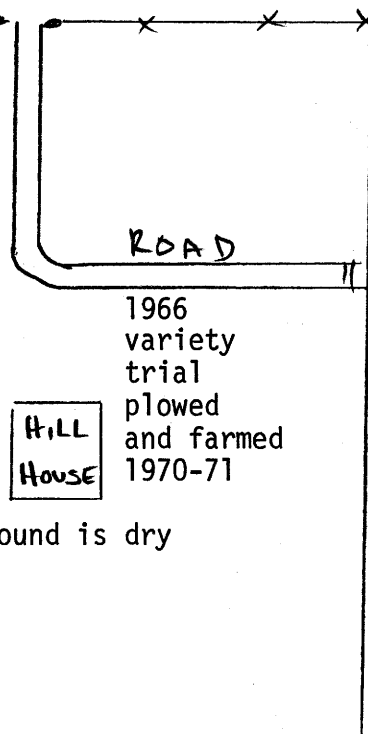
BLACK BUTTE RANCH - Dick Conway

Soil Analysis: pH 5.5
 P 6 ppm
 K 106 ppm
 SO₄-S 8 ppm

Rose clover flown on Fall 1954 with no seedbed preparation or seed coverage

Variety, fertilizer and inoculation trials conducted 1966-1968
 (see attached) field burned 1967

<u>fertilizer applied/acre</u>	<u>year</u>
200 lbs. single super	1966
50 lbs. treble + sulfur	1968
100 lbs. single super	1974
100 lbs. single super	1975
100 lbs. single super	1976
100 lbs. single super	1977



Typical Management - 275 acres

278 yearling steers or 140 pairs turned in only after the ground is dry enough in March or April graze for 6 to 8 weeks.

Stocking rate .99 acre/steer or 1.96 acres/cow pair

Carrying Capacity

$$\begin{aligned} \text{No \& Class} \times \text{Ave. Wt.} &= \text{Total Lbs.} \div 1000 = \text{Animal Units} \times \text{Days} = \text{AU Days} \\ 278 \text{ steers} \times 675 \text{ lbs.} &= 187650 \text{ lbs.} \div 1000 = 187.65 \text{ AU} \times 49 \text{ days} = 9195 \text{ AU day} \end{aligned}$$

$$\begin{aligned} 9195 \text{ AUD} \div 365 &= 25.2 \text{ AU Year} \times 12 = 302 \text{ AUM} \\ 302 \text{ AUM} \div 275 \text{ acres} &= 1.10 \text{ AUM/Acre} \\ 275 \text{ acres} \div 302 \text{ AUM} &= .91 \text{ Acres/AUM} \\ 275 \text{ acres} \div 25.2 \text{ AU Year} &= 10.9 \text{ Acres/AU} \end{aligned}$$

or

Carrying Capacity

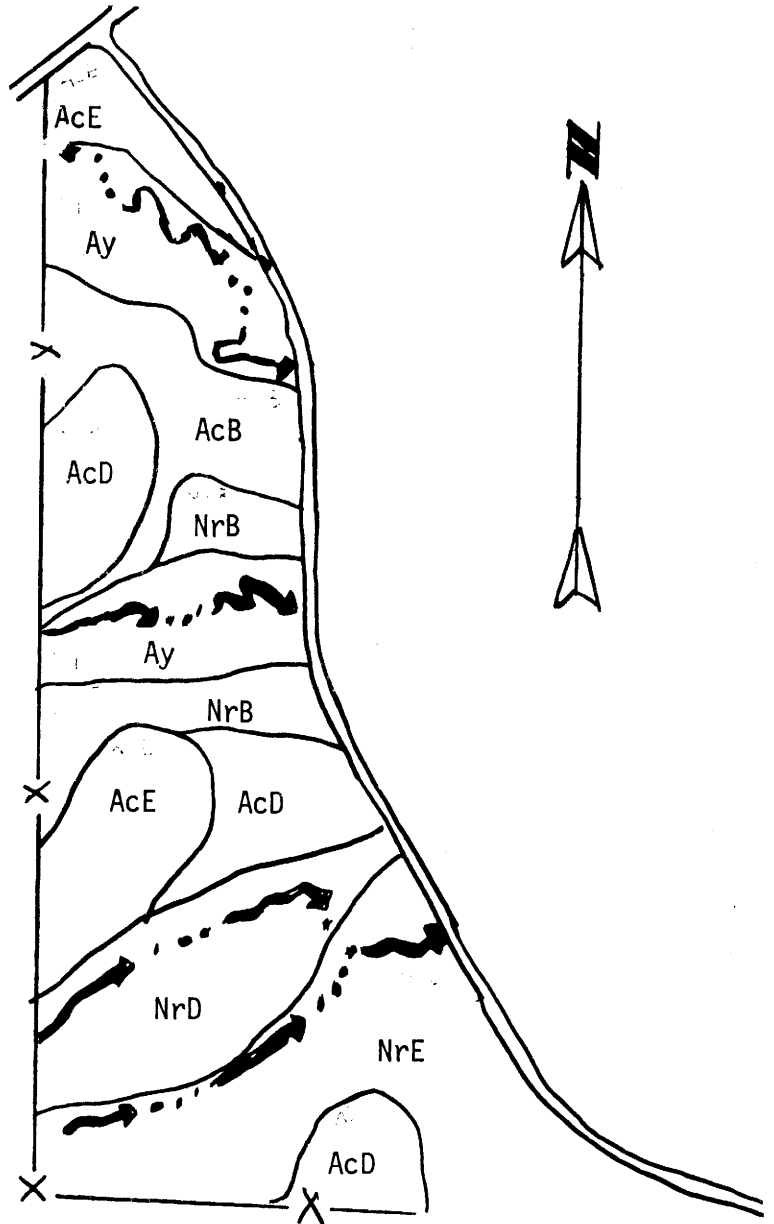
<u>No & Class</u>	<u>x</u>	<u>Ave. Wt.</u>	<u>=</u>	<u>Total Lbs.</u>	<u>÷</u>	<u>1000</u>	<u>=</u>	<u>Animal Units</u>	<u>x</u>	<u>Days</u>	<u>=</u>	<u>AU Days</u>
140 cows	x	1000 lbs.	=	140000 lbs.	÷	1000	=	140 AU	x	49 days	=	6860
140 cows	x	350 lbs.	=	49000 lbs.	÷	1000	=	49 AU	x	49 days	=	2401
TOTAL											9261	

$$\begin{aligned} 9261 \text{ AUD} \div 365 &= 25.37 \text{ AU Year} \times 12 = 304 \text{ AUM} \\ 304 \text{ AUM} \div 275 &= 1.11 \text{ AUM/Acre} \\ 275 \text{ Acres} \div 304 &= .90 \text{ Acres/AUM} \\ 275 \text{ Acres} \div 25.37 \text{ AU Year} &= 10.8 \text{ Acres/AU} \end{aligned}$$

FIELD EVALUATION PLANTING SITE
Black Butte Reservoir
Buckhorn Recreation Area

List of Mapping Units

- AcB Altamont Clay, terrace,
3 to 10 percent slopes
- AcD Altamont Clay, terrace,
10 to 30 percent slopes
- AcE Altamont Clay, terrace,
30 to 50 percent slopes
- Ay Arbuckle gravelly loam,
clayey substratum,
channeled
- NrB Newville gravelly loam,
3 to 10 percent slopes
- NrD Newville gravelly loam,
10 to 30 percent slopes
- NrE Newville gravelly loam,
30 to 50 percent slopes



**BLACK BUTTE
FIELD EVALUATION PLANTING
1971-72**

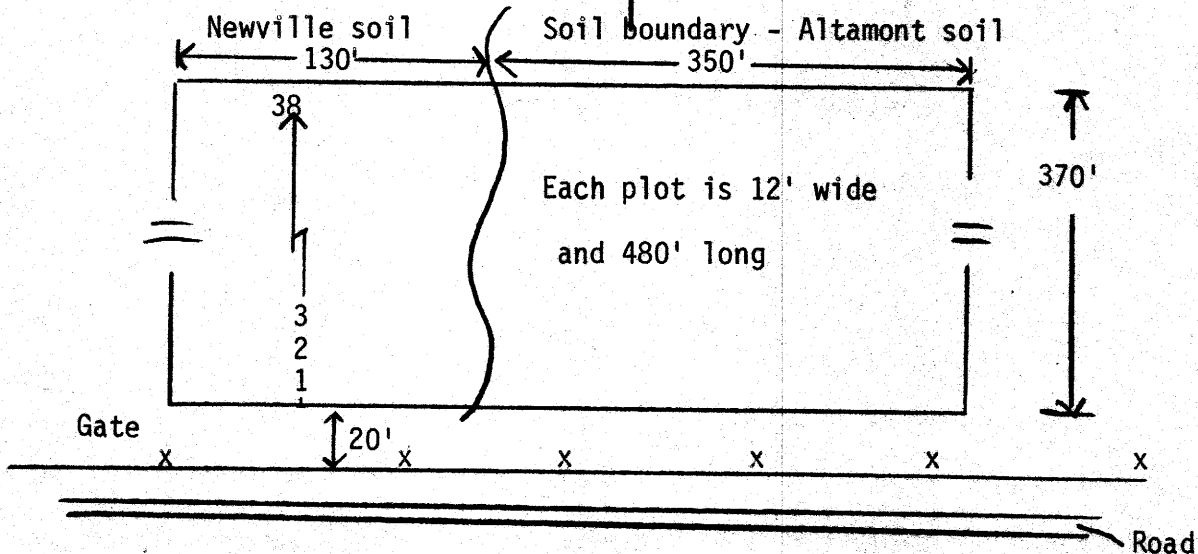
The Black Butte Field Evaluation Planting was started in the fall of 1971. It serves an area within MLRA 15. Parts of Shasta, Tehama, Glenn, Colusa, and Yolo Counties are included in the area it serves. The area is characterized by low natural fertility, low available water holding capacity of the soils, sloping land and poor rainfall distribution. The principle objectives of the FEP are earlier winter forage, more mid-winter forage, improved management practices on rangeland plants that will cure well as standing hay for fall and winter forage, improved plants for critical areas and improved wildlife cover plants and establishment techniques.

The 1971-72 weather was characterized by below normal precipitation, usually cold winter months and poor rainfall distribution. The total rainfall was 10.66 inches below the normal 18.84 inches.

**VARIETY TRIAL
Seeded Oct. 18, 1971**

	<u>#/A</u>			<u>#/A</u>
1. Perla Kolegrass	6	13. Mixed clovers - Daliak, Howard,		
2. Hardinggrass	6	Woogenellup sub, Hykon rose	20	
3. Palestine orchardgrass	10	14. Mixed clovers - Geraldton,		
4. Goars tall fescue	12	Woogenellup, Mt. Barker sub,		
5. Largo tall wheatgrass	12	Wilton rose	20	
6. Trigo pubescent wheatgrass	12	15. Wilton rose clover		16
7. Luna pubescent wheatgrass	12	16. Hykon rose clover		16
8. Topar pubescent wheatgrass	12	17. Kondinin rose clover		16
9. Oahe intermediate wheatgrass	12	18. Seaton Park sub clover		16
10. Greenar intermediate wheat-		19. Howard sub clover		16
grass	12	20. Woogenellup sub clover		16
11. Sodar streambank wheatgrass	12	21. Daliak sub clover		16
12. Mixed clovers - Geraldton,		22. Geraldton sub clover		16
Seaton Park sub, Wilton		23. Mt. Barker sub clover		16
Rose	20	24. Harbinger barrel medic		16
		25. Jemalong barrel medic		16
		26. Bur clover		16
		27. Lana vetch		15
		28. Blando brome		8
		29. Wimmera 62 ryegrass		10
		30. Undisturbed native annuals		--

Double rows, 12" apart of Currie and Bieber orchardgrass, Purple needlegrass and Atriplex canescens, 200' long measuring from the So. end.



RESULTS

Due to late rains and cold weather, the perennials came slowly and made limited growth. In April plant counts indicated all species had established but the seedlings were small. Volunteer growth of wild oats on the Altamont was clipped in April. There were no satisfactory stands of the perennials in the fall of 1972 following early rains.

The annuals also started slow and made poor growth. All were inferior to the growth of wild oats on the site. None were enough to warrant harvest. However, some late spring rains provided adequate moisture for all annual plots to produce a seed crop. The early fall rains in 1972 brought up good stands. Stand counts were not made during the 1971-72 season. By November 1, 1972, the oats were 6" tall, while the clovers were only 1-2" tall.

ANNUAL LEGUMES

All varieties reproduce seed and generally a good stand is present today. Lana vetch exists only on the Newville soil. A clipping of all plots in the spring of 1971 prevented the vetch from making seed.

ANNUAL GRASSES

Wimmera rye and Blando brome were seeded. The ryegrass provided a very good early ground cover. A dry spring limited seed production. Blando brome was rather slow in the beginning, but produced a good seed crop and a good stand in the fall of 1972.

Glenn County Moly plots

Harvested 4-10-61

Treatment	Total yield lbs/A	Stat. Sig. ^{1/}	Estimated percent clover	Estimated clover yield
Check	720		16	115
PMo ₂	1380		26	359
PMo ₃	1548		19	294
PMo ₁	1720		23	396
P	1860		33	614
PS	2420		48	1162
PS Mo ₃	2460		65	1599
PS Mo ₂	2641		51	1347
PS Mo ₁	2861		60	1717
NPS Mo ₃	6261		2	120
NPS	6001		2	125

1554

^{1/} Statistical significance