

Agronomy Experiments at the Brown Hereford Ranch

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History: From 1900 to 1943 the cereal crops were grown. In the early years there was a crop every year. In later years a poor crop of cereal hay was produced every second or third year with some volunteer pasture between crop years.

Experimental fields: Field I. Eleven acres. Seeded on summer fallow, November, 1944. Species used: 8, 13, 14, 16, 17, 20, 28, 30, 61, 63. Plot survivals: 34, 35, 102.

Field II. Five acres. Seeded November, 1945. Species used: 13, 17, 28, 30, 35, 100, 102. Rose clover (102) only on lower half of field.

November, 1949. Disked, phosphated, seeded mixture of 56, 98, 101, 102.

Field III. Five acres. Seeded December, 1946. Species used: 8, 13, 30 in one drill row, and 17, 26, 28, 61 in other. North half: 102; south half: 56.

A rectangle straddling II and III disked fall 1950 and seeded to 17 and 28 to study effect of clovers phosphated and not on ease of establishment of harding.

Field IV. Ten acres. "Checkerboard" seeded November, 1947. Species used: 18, 26, 28, 30, 34, 35, 91, 98, 100.

Field V. Ten acres. Seeded January, 1949 (too late). Almost a complete failure. In October, 1949, treated as Field II.

The problem. Soil improvement (winter annual legumes, fertilizer). The right plants. Establishment. Maintenance and continued improvement.

Seasonal livestock use is the hub about which all range improvement must turn. Treat the range as a crop. Use the animals for biological control of plant composition.

Improve the range by replacing a relatively undesirable population of plants (foxtail, tarweed) by a more desirable type (soft chess, annual legumes, and eventually add hardinggrass).

Significant results. Field I. 1951. 39 head March 15-24 (9 days). Note: no rainfall March 15 to May 2. Mowed and shocked May 7. 3 head November 7 to December 9 (32 days). For calendar year 39 animal days per acre.

Field II, III. 1951. 43 head March 6-15 (9 days). Mowed and shocked May 7. 20 head October 25 to November 7 (13 days). 3 head November 7 to December 9 (32 days). For calendar year 71 animal days per acre.

Field IV. 1951. 43 head March 3-6 (3 days). 13 animal days per acre.

Field V. 1951. 43 head March 24 to April 1 (10 days). Mowed, shocked. Shocks removed. 43 animal days per acre. In this field 218# TSP gave 4940# dry weight and 926# crude protein per acre vs. 1280# and 143# crude protein. Gain 4 times the forage and $6\frac{1}{4}$ times the protein.

February 13, 1952

KEY TO RANGE SPECIES

NOTE: This replaces all previous keys. Please remove earlier issues from your active files.

1 Crested wheatgrass *P	46 Lemmon stipa P
6 Tall meadow oatgrass P	47 Junegrass P
6A Tualatin strain tall oatgrass P	56 Mt. Barker subterranean clover A
7 Mountain brome grass SLP	61 Yellow Blossom sweetclover B
8 Alta fescue P	61A Yellow Blossom sweetclover "Madrid" B
8A Kentucky 31 tall fescue P	63 Orchard grass P
8B Goar strain tall fescue P	63A Akaroa orchard grass P
9 California oatgrass P	64 Smooth brome (Lincoln strain) P
11 Red fescue P	65 Big trefoil P
11A Creeping red fescue	67 Rhodes grass P
11B Chewings fescue P	68 Dallis grass P
12 Ryegrass 12 SLP	70 Weeping lovegrass P
13 Annual ryegrass A	78 Blue grama P
14 Perennial ryegrass SLP	79 Side-oats grama P
15 Erect birdsfoot trefoil P	91 Veldtgrass P
16 Prostrate birdsfoot trefoil P	91A Unarlee Veldtgrass P
17 California common alfalfa P	96 Alfalfa Pilca Butta P
18 Ladak alfalfa P	97 Early Dwalganup subclover A
19 Black medic A	98 Late Tallarook subclover A
20 Bur clover A	100 Harlan brome grass SLP
25 Prairie grass SLP	101 Crimson clover A
26 Smilo P	101C Autauga strain Crimson clover A
26A S.C.S. sel. Smilo P	102 Rose clover A
26T Smilo treated seed P	103 Big bluegrass P
27 Indian ricegrass (sandgrass) P	104 Kentucky bluegrass P
28 Harding P	105 Redtop P
29 Creeping rooted alfalfa P	106 Timothy P
30 Burnet P	107 Alsike clover P
31 Idaho fescue (blue bunchgrass) P	108 Red clover B
34 Nodding stipa P	109 Intermediate wheatgrass P
35 Purple stipa P	110 Stipa rosengurtii P
36 Meadow foxtail P	111 Stipa hyalina P
37 Bulbous barley P	112 Highland bentgrass P
	113 Elymus glaucus (Lomas strain) P

63C ORCHARDGRASS, PALESTINE

- * A = Annual
 B = Biennial
 SLP = Short-lived perennial (may act as annual)
 P = Perennial

Increasing Stands of Hardinggrass

D. C. Sumner

Statements have been made that once hardinggrass is established, the stand will not spread. No doubt some of these statements are true. However, here at the Brown Hereford Ranch the situation is quite different.

In the fall of 1944, a mixture of grasses and legumes, including 1 lb/acre of hardinggrass was seeded in Field I. In the fall of 1947, 170 plots 10 feet x 10 feet in size were established for the purpose of a population count of the hardinggrass plants. In the fall of 1950, another count on the same plots was taken with the following results. In 1947, there were 1041 plants. In 1950, there were 1514 plants, a 45 percent increase of hardinggrass plants. There was an increase in 101 plots, an equal number of plants in 42 plots, and less plants in 27 plots.

In three years we have a sizeable 45 percent increase in hardinggrass population. These additional plants had to be from natural reseeding, as there was no reseeding done in this field since the original 1944 planting.

Seasonal use of the range has encouraged the reseeding of hardinggrass. Also the increase in population does not tell the whole story, because the original plants have themselves increased in size and added considerably to the amount of forage, along with the 45 percent increase in the number of plants.

A possible explanation as to why some hardinggrass stands spread and others do not rests upon "seasonal use". Field I at the Brown Hereford Ranch is utilized early and heavily, the stock then taken off before the soil moisture is exhausted. This system of management keeps the individual harding-

grass plants from becoming excessively large in relation to the available soil moisture. Upon stock removal the plants recover and mature a fair seed crop. A clean up grazing in the late summer and early fall utilizes the regrowth and tramples the shattering seed into the ground.

In Humboldt County there is an excellent stand of hardinggrass, about half acre in size. This stand, 15 years or older, had not spread from its original enclosed area and was confined to an almost perfect rectangle. When the plots was last seen, several years ago, there was no evidence of the plants having been grazed. The crowns were 1 to 2 feet in diameter and plants 5 to 6 feet high. The area between plants was almost bare of other vegetation and the heads bore only blasted seed. Under this system of total protection and lack of grazing, the hardinggrass had been allowed to attain maximum vegetative growth. Soil moisture was exhausted before seed could be formed. Alfred Murphy, who was then working in the county, had the owner build a gate in the fence so that grazing could be managed. Since that time the hardinggrass is beginning to spread from the plot confines.

Proper seasonal use, not exclusion or continuous grazing, is the answer to many of the problems of range seeding.

Range Seeder - D. C. Sumner

The experimental range seeder was developed to provide a means of establishing stands of better forage species on non-tillable land where the competition from resident annuals prevented success by other methods of seeding.

Results so far have been very promising, indicating that any range operator can take advantage of this method of seeding accessible range land. This can be done if the operator is willing to accept the added initial effort and expense and follow up with the necessary management to insure a stand.

The causes of the failures encountered thus far can be divided into three main categories:

1. Many seedling stands have been lost due to freezing and soil heaving. Seeding where these conditions are expected is always a hazard.

2. Attempting to seed the better forage species on the cooperators' poorest, worn out soils of very low fertility. This dooms the project to unquestionable failure. The range seeder should only be used on areas where the seeded species have a chance to survive. There are other methods of improving the poorer sites.

3. The lack of any management or control of grazing after seeding. Many excellent seedling stands have been established on soil with every chance of success only to be grazed out or become so spindly trying to compete for sunlight with the uninhibited resident annuals that they succumb with the first grazing or mowing.

If success is to be achieved using this method of seedling range land, only the better soils must be used and steps taken to encourage and maintain the stand.

See California Agriculture, March, 1951
"New Planter for Range Seeding"

Seedling Competition - D. C. Sumner

Too little is known of the part plant competition plays as a factor in range improvement. We have all observed that resident range grasses mature a considerable quantity of seed. We accept this as a fact and proceed to overlook it as having much bearing upon present and future composition of the range forage.

Our resident range plants can be conveniently divided into two general groups, 1. desirable and 2. undesirable. Generally the undesirable annuals mature earlier than the desirable ones, with some exceptions, of course. Coupled with this is the fact that they also produce seed and seed heads with obnoxious characteristics so that grazing animals will not readily eat them. This situation is the reverse for the desirable grasses where grazing animals consume stems, heads and seeds with relish.

The large amount of seed produced by these resident annuals provides varying degrees of seedling competition and is a limiting factor in establishing, by seeding, better forage species. Preliminary studies indicate that, on the range areas studied, there were from 1,412 to 2,116 viable seeds per square foot or 262 to 419 pounds of seed per acre of resident annual seeds on the surface ready for the first fall rains. See chart I. What slow germinating, slow growing perennial seedling can compete with this enormous competition? Can a rancher afford to seed such areas with a comparable seeding rate?

As has been explained in the past, early heavy grazing utilizes the undesirable annuals before their obnoxious characteristics appear and also prevents maximum seed production. The removal of the animals from the field before the desirable annuals mature assures maximum seed production of these

species. Table II helps to substantiate this. In table II the number of seeds per square foot is divided into the components, desirable and undesirable. Note the almost equal number of seeds per square foot of desirable and undesirable species on the Sonoma II plot. Table III shows the results based upon pounds of seed per acre. This gives an inaccurate picture, however, because of the differences in size and weight of seed of individual species. Table IV is interesting because it shows the results from the dust blow area of the lower San Joaquin Valley.

The results of this preliminary study raise several interesting questions that we hope to be able to answer in the near future: 1) what is the effect on total forage yield of resident annuals by this enormous seedling competition? 2) can higher yields be obtained from our resident range annuals by controlling this early competition to allow a more rapid and fuller development of fewer individual plants?

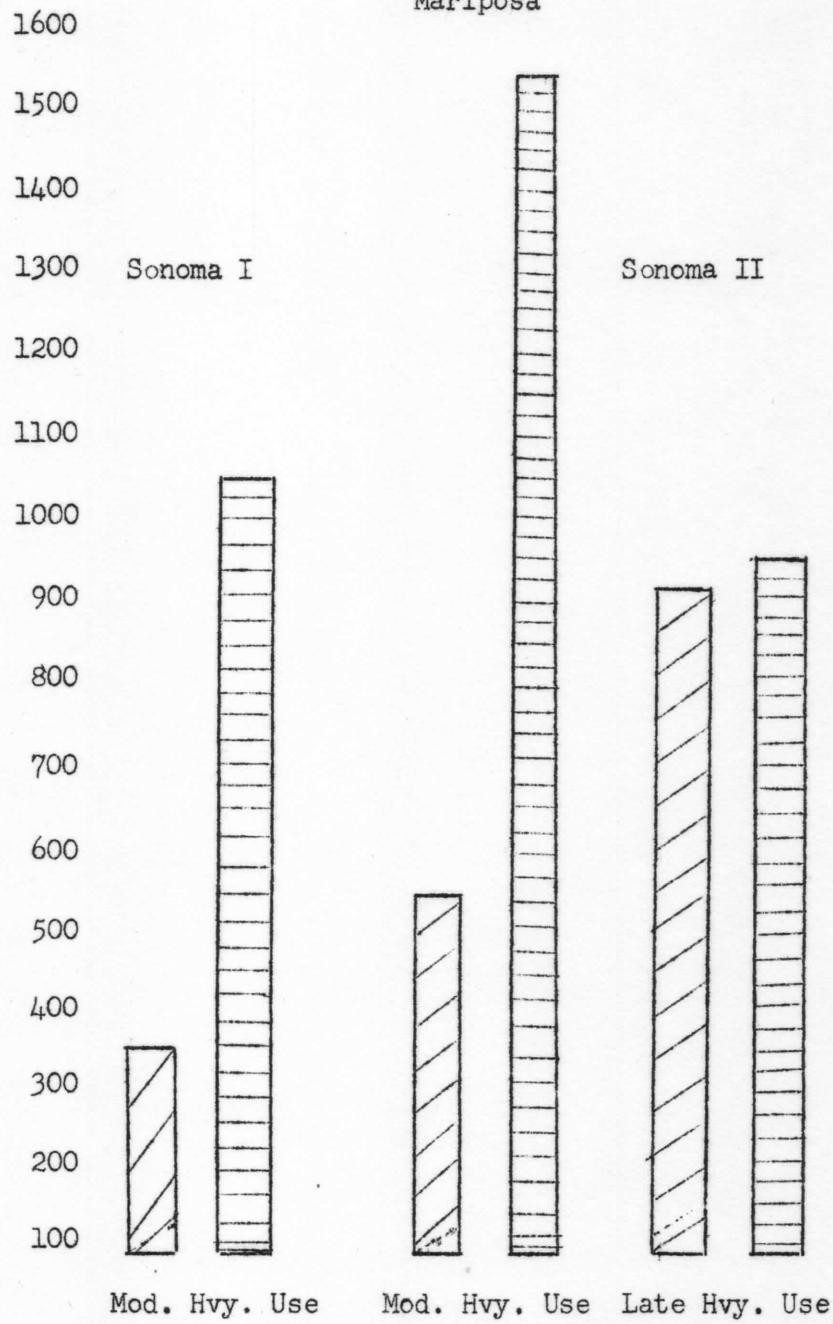
Table I

Species	% Germination	Sonoma I		Sonoma II		Mariposa		Kings County Dust Blow Area	
		Seed per Sq. foot	Lbs. seed per acre	Seed per Sq. foot	Lbs. seed per acre	Seed per Sq. foot	Lbs. seed per acre	Seed per Sq. foot	Lbs. seed per acre
Rigut	81.5	133.38	119.33	21.18	20.22				
Mediterranean Foxtail	93.5	8.35	3.02	.31	.16	460.01	192.79		
Rattail Fescue	71.5	215.45	10.92	892.05	59.34	97.00	5.59		
Red Brome	77.0							23.86	4.40
Filaree	56.0	53.01	13.73	1.86	.36	6.16	1.95	6.25	1.85
Soft Chess	83.0	996.55	167.35	522.62	106.97	1,552.59	218.59		
Wild Oats	--	2.66	7.92	.66	1.98				
Ryegrass	66.5	.66	.11	421.26	65.24				
Bur clover 85 hard seed	11.0	2.53	.44	7.73	5.45	.44	.12		
Tree clover	--			1.33	.19				
Subclover	--			2.33	1.05				
Squirrel Tail	--			1.66	.75				
Blow Wives	--			2.33	1.05				
Total		1,412.59	322.82	1,875.32	262.76	2,116.20	419.14	30.11	6.25

Seed counts and weights corrected from the original
to conform to the germination percentage

Table II

Mariposa



Seeds/sq. foot .

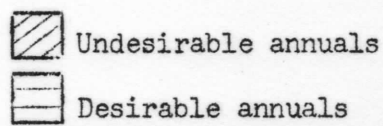
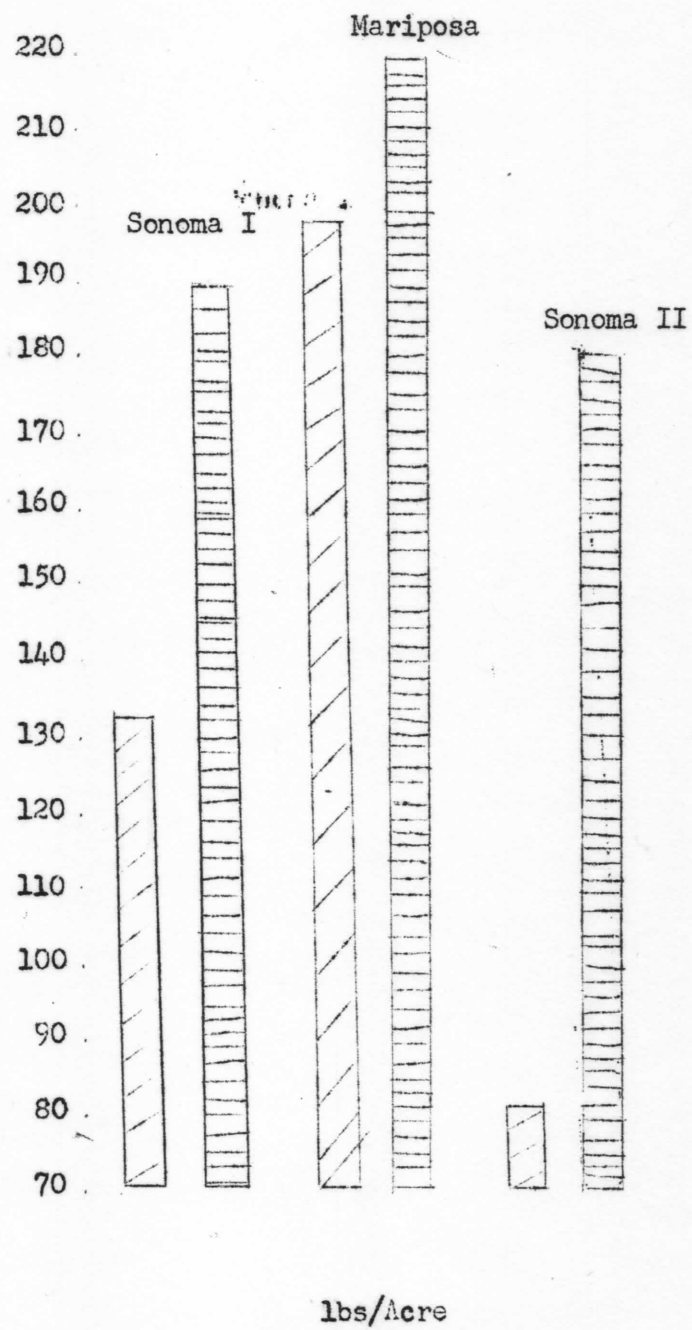


Table III



undesirable annuals

desirable annuals

Table IV

Kings Co. Dust Area

