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Wm. A. Schoenfeld, Director  
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CRESTED WHEAT GRASS PRACTICES ON  
WHEAT FARMS IN FOUR EASTERN OREGON COUNTIES\*

by  
H. L. Thomas, D. Curtis Mumford, and E. R. Jackman <sup>1/</sup>

Introduction

Acreage of crested wheat grass is increasing rapidly in Eastern Oregon. From less than 5,000 acres, prior to 1936, the acreage of this grass has increased to an estimated total of 100,000 acres in 1939. Preliminary estimates indicate that nearly 50,000 additional acres will be seeded in the fall of 1939. Nearly all of this increase has been accompanied by a corresponding decrease in land used for wheat.

While the Agricultural Adjustment Administration program has been directly responsible for much of this increased grass acreage, farmers in the area have repeatedly gone on record favoring retirement of large acreages of wheat land to grass. It is likely that the move toward grass would go forward in many places even if Agricultural Adjustment Administration support were withdrawn. This is particularly true in parts of the Columbia Basin where land is steep, shallow, patchy, or extremely low yielding. In the more level, higher-yielding areas it is likely that abandonment of "Triple A" policy would result in reversion to wheat of many of the newly planted grass areas.

Such widespread changes in land use on thousands of acres will naturally affect the income from the land involved. Farm operations may need to be changed drastically and no one can foretell what the results will be.

In order to survey the situation, a questionnaire was sent to farmers in four Eastern Oregon wheat-producing counties in January and February, 1939. The purpose of this effort was to gather first-hand information on crested wheat grass practices, specifically with reference to the kind and quality of land seeded,

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<sup>1/</sup> H. L. Thomas, Associate Agricultural Economist, Soil Conservation Service; D. Curtis Mumford, Economist, Department of Farm Management, Oregon State Agricultural College; and E. R. Jackman, Extension Specialist in Farm Crops, Oregon State Agricultural College.

the stand obtained, and the use being made of the grass. A special effort has been made to determine its contribution, in terms of grazing, to the livestock program.\*

The questionnaire was mailed to approximately 271 farmers located in Baker, Gilliam, and Sherman Counties. Of this number, 94 schedules, or 35 per cent, were returned. In addition, 25 Wasco County farmers were interviewed by an enumerator, making a total of 119 schedules used in the tabulation. The following pages give the tabulated results of the questionnaire and comment on the information.

As shown in Table 1, these schedules contained information on 381 individual fields or seedings, comprising 9,055 acres of crested wheat grass. This represents, in these four counties, approximately 31 per cent of the total grass seedings that were one year old or older at the time this study was made.

TABLE 1. THE NUMBER OF FARMS AND FIELDS, AND THE ACREAGE OF CRESTED WHEAT GRASS INCLUDED IN SURVEY, BY COUNTIES.

County	Number farms	Number seedings or fields	Acreage crested wheat grass	Average acres seeded per farm	Average acreage per seeding
Baker.....	28	50	679	24	13
Gilliam.....	33	93	3,959	120	43
Sherman.....	33	142	2,678	81	19
Wasco.....	25	96	1,739	69	18
TOTAL	119	381	9,055	76	24

Wheat Land Was Largely Used For Grass Seedings

The economic significance of retiring cultivated land to grass depends, first of all, on the kind and quality of the land being retired. The data presented in Table 2, show that 86 per cent of the grass seedings included in this study were made on land previously used for wheat. Another 12 per cent was previously used for either grain hay or grain pasture. A minor percentage of these seedings was made on either abandoned wheat land or native pasture.

\* This survey is a part of a more comprehensive research program, one of the objectives of which is: to determine the economic significance of crested wheat grass as a soil-conserving practice.

TABLE 2. PREVIOUS USE OF LAND SEEDED TO CRESTED WHEAT GRASS

Previous use of land	Counties				Total	
	Baker Acres	Gilliam Acres	Sherman Acres	Wasco Acres	Acres	Per cent
Wheat.....	493	3,746	1,695	1,636	7,570	86
Grain hay.....	81	125	239	103	548	6
Grain pasture.....	1	186	311	-	498	6
Abandoned or idle land.....	28	35	-	-	63	1
Other.....	76	9	-	-	85	1
TOTAL.....	679	4,101	2,245	1,739	8,764	100

Farmers Seed Grass on Land Slightly Below Average

The average yield of wheat on land seeded to grass is shown in Table 3. A comparison is made between the average yield for the land seeded to grass and the average yield of wheat for the entire farm on the farms included in this study. The results show that the average yield of wheat on the land seeded to grass varied, by counties, from 0.1 to 1.8 bushels less per acre than the entire farm-average wheat yield on these farms. This indicates that, in general, farmers have retired wheat land of less than average quality.

TABLE 3. THE AVERAGE YIELD OF WHEAT PER ACRE ON LAND SEEDED TO CRESTED WHEAT GRASS BY FIELD, FARM, AND COUNTY

County	Acres seeded to grass	Average yield of wheat (Fields seeded)	Average yield of wheat (Farm)	Difference between field and farm yield	Per cent of farm yield	Average yield of wheat (County)	Difference between field and county yield
Baker.....	663	16.2	18.0	-1.8	90	24.7	-8.5
Gilliam...	3,831	9.7	11.1	-1.4	87	11.8	-2.1
Sherman...	2,350	15.2	15.5	-0.3	98	16.4	-1.2
Wasco.....	1,401	19.5	19.6	-0.1	99	18.7	+0.8
TOTAL	8,245	13.4	14.4	-1.0	93	15.6	-2.2

The wide discrepancy between the farm yields and the county average in Baker County is due to the fact that many of the wheat farms upon which crested wheat grass was seeded are nonirrigated, while irrigated land enters into the county average.

Reasons for seeding certain wheat land to grass. An effort was made in this study to determine the reason why certain wheat fields or parts of fields have been retired to crested wheat grass. More specifically, the effort was designed to discover what considerations were uppermost in the farmer's mind in deciding which land to seed to grass. Answers to this question are summarized in Table 4.

TABLE 4. THE RELATIVE IMPORTANCE OF SEVERAL REASONS FOR SEEDING WHEAT LAND TO CRESTED WHEAT GRASS, BY COUNTIES

Reason	Baker		Gilliam		Sherman		Wasco		Total	
	Acres	Per cent	Acres	Per cent	Acres	Per cent	Acres	Per cent	Acres	Per cent
Irregular or isolated field.....	71	9	671	16	327	14	1,085	50	2,154	23
Shallow soil.....	35	5	1,482	36	355	15	163	7	2,035	21
Steep land.....	68	9	355	9	275	11	508	23	1,206	13
Convenient or needed for pasture.....	393	51	640	16	109	5	38	2	1,180	13
To shape up field.....	-	-	-	-	110	5	209	10	319	3
To control erosion.....	-	-	472	11	126	5	-	-	598	6
To comply with AAA Program.....	26	4	478	12	1,077	44	52	2	1,633	17
Other.....	175	22	-	-	38	1	135	6	348	4
TOTAL ACRES.....	768	100	4,098	100	2,417	100	2,190	100	9,473*	100

\* A duplication of acreage results from more than one reason being specified in case of many fields.

The results show that irregular or isolated fields, shallow soil, steep land, and the need for pasture are primary considerations in determining the location of grass seedings on these farms. The specific situation varies, however, from one county to another. Thus, Baker County is a livestock county and the need for pasture or the convenience to pasture, due to location, were important reasons for retiring certain wheat land to grass. In Gilliam County, shallow, low-yield land was mentioned most by farmers, although the need for pasture is also important in this county. In Sherman County, shallow soil and irregular and isolated fields

are important reasons, although many farmers in this county specified no other reason than to cooperate in the agricultural adjustment program. Wasco County is very rough, and farmers there said that irregular fields and steep land were the main reasons for seeding certain wheat land to grass.

### Seeding Practices

Year seeded. A special effort was made in this study to include as many old or mature seedings as feasible. The results of this effort are presented in Table 5. They show that 68 per cent of the grass covered by this survey was two years old or older, 25 per cent was one year old, and 7 per cent was new seeding.

TABLE 5. THE AGE OF CRESTED WHEAT GRASS REPORTED ON IN THIS STUDY

County	Year seeded				Total Acres
	1938 Acres	1937 Acres	1936 Acres	Before 1936 Acres	
Baker.....	18	462	224	81	785
Gilliam.....	-	650	3,101	33	3,784
Sherman.....	196	946	1,378	38	2,558
Wasco.....	414	157	1,139	15	1,725
TOTAL.....	628	2,215	5,842	167	8,852
PER CENT.....	7	25	66	2	100

Seeding mixture. Answers to this question revealed that crested wheat grass was sown alone on practically all the land included in this study. The only exceptions were in the cases of 214 acres seeded with Bulbous bluegrass in Gilliam County and 253 acres seeded with Bulbous bluegrass and alfalfa in Sherman County.

Rate of seeding. The rate of seeding crested wheat grass is shown in Table 6. It varied from 2 to 12 pounds per acre, but 74 per cent of the acreage was planted at the rate of from 4 to 6 pounds per acre. Baker County farmers used a higher average rate because of the need of the grass for pasture. Wasco County farmers made more of the 8- and 10-pound seedings because thin plantings are not so satisfactory for erosion control. Within a county, in general, the lighter the rainfall the lighter the seeding rate per acre. This is as it should be. Experience has shown that heavy stands are at a disadvantage in dry years.

TABLE 6. RATE OF SEEDING CRESTED WHEAT GRASS

County	Pounds per acre									Total reported Acres
	2 Acres	3 Acres	4 Acres	5 Acres	6 Acres	7 Acres	8 Acres	10 Acres	12 Acres	
Baker.....	25	-	132	305	11	-	193	67	-	733
Gilliam.....	-	154	1,323	1,807	705	-	43	135	15	4,182
Sherman.....	83	126	556	535	159	444	42	9	179	2,133
Wasco.....	-	19	82	431	440	22	469	266	-	1,729
TOTAL.....	108	299	2,093	3,078	1,315	466	747	477	194	8,777
PER CENT...	1	4	24	35	15	5	9	5	2	100

The method of seeding. Table 7 indicates the relative importance of different methods of planting crested wheat grass. Of the 8,779 acres reported, 88 per cent was planted with a drill, and only 12 per cent was broadcast. Approximately one-half of the grass planted with a drill, was drilled solid. The balance was planted in rows 14 to 35 inches apart. Growers who expected to harvest seed nearly always planted in rows. Those desiring the grass for pasture or erosion control generally planted solid.

TABLE 7. METHOD OF SEEDING CRESTED WHEAT GRASS IN FOUR COUNTIES

County	Drilled solid Acres	Drilled 14" rows Acres	Drilled 21" rows Acres	Drilled 28" rows Acres	Drilled 35" rows Acres	Broad- cast Acres	Total reported Acres
Baker.....	210	-	118	-	52	-	380
Gilliam.....	1,686	1,080	824	-	428	205	4,223
Sherman.....	251	190	557	209	622	608	2,437
Wasco.....	892	514	111	-	-	222	1,739
TOTAL..	3,039	1,784	1,610	209	1,102	1,035	8,779
PER CENT	35	20	18	2	13	12	100

The stand obtained. The stand obtained on 6,622 acres of crested wheat grass is shown in Table 8. The results show that a good stand was obtained on 54 per cent, a fair stand on 27 per cent, and a poor stand on 19 per cent of this land area. Many of the stands reported as fair or poor will be reported as good in two or three years' time, judging by the experience with seedings made 4 years ago or longer.

TABLE 8. THE STAND OBTAINED FROM CRESTED WHEAT GRASS PLANTINGS, BY COUNTIES

County	Poor	Fair	Good	Total
	Acres	Acres	Acres	Acres
Baker.....	91	310	357	758
Gilliam.....	864	774	1,821	3,459
Sherman.....	104	256	720	1,080
Wasco.....	168	436	721	1,325
TOTAL.....	1,227	1,776	3,619	6,622
PER CENT.....	19	27	54	100

Seed Production Was Profitable in 1938

A minor portion of the crested wheat grass in Eastern Oregon is harvested for seed. Of the 9,055 acres covered in this study, 2,104 acres were reported harvested in this manner in 1938. The county average yield varied from 80 pounds to 232 pounds per acre. The weighted average yield for the four counties was 116 pounds of seed per acre. The gross return per acre, figured at 20 cents per pound, was \$23. These same farms reported a long-time average of 14.4 bushels of wheat per acre. This would raise the question, "Why doesn't everyone grow seed?" But indications are that the 1939 yields of seed on these farms will be almost zero. It is quite likely that 1938 was a better seed year than average and that prices will decline still further as more acreage comes into seed production.

TABLE 9. CRESTED WHEAT GRASS SEED PRODUCTION

County	Acres	Total production (Pounds)	Value @ 20¢ per pound (Dollars)	Yield per acre (Pounds)	Gross value per acre (Dollars)
Baker.....	188	43,540	8,708	232	46
Gilliam.....	1,161	119,641	23,928	103	21
Sherman.....	508	59,973	11,995	118	24
Wasco.....	234	18,701	3,740	80	16
TOTAL	2,091	241,855	48,371	116	23

The variation in yield of crested wheat grass seed between counties is partly accounted for by a difference in soil conditions. For example, in Baker County, high yields are obtained on productive bottom land.

#### Crested Wheat Grass Used for Grazing

The long-time use for most of the crested wheat grass in the Columbia Basin will undoubtedly be grazing. It is important, however, that new seedings be grazed lightly, if at all, during the seedling stages. Table 10 shows the extent of grazing of 1936 and 1937 seedings, in 1938.

TABLE 10. THE EXTENT OF GRAZING ON ONE- AND TWO-YEAR-OLD SEEDINGS IN 1938

County	Extent of grazing on seedings planted in 1936				Extent of grazing on seedings planted in 1937			
	None Acres	Light Acres	Moderate Acres	Heavy Acres	None Acres	Light Acres	Moderate Acres	Heavy Acres
Baker.....	89	27	91	23	243	132	49	5
Gilliam....	641	612	1,393	430	275	348	27	84
Sherman....	387	556	190	195	268	51	123	-
Wasco.....	57	60	416	313	29	28	65	14
TOTAL	1,174	1,255	2,090	961	815	559	264	103
PER CENT	21	23	38	18	47	32	15	6



The results show that 47 per cent of one-year-old seedings was not grazed in 1938, 32 per cent was grazed lightly, 15 per cent moderately, and only 6 per cent was grazed heavily. The latter compares with 18 per cent for two-year-old seedings.

When to graze crested wheat grass. Farmers were requested to evaluate crested wheat grass according to growth, characteristics, palatability, and grazing capacity. This was accomplished largely by making a comparison between crested wheat grass and native bunch grass. The results of making such a comparison with reference to the time of "greening up" in the fall and spring are shown in Table 11. They indicate farmers have observed that crested wheat grass "greens up" earlier than native bunch grass, both in the spring and fall.

TABLE 11. SUMMARY OF ANSWERS TO QUESTION:

"DOES CRESTED WHEAT GRASS 'GREEN UP' MORE RAPIDLY THAN  
NATIVE BUNCH GRASS?"

Answer	Baker	Gilliam	Sherman	Wasco	Total	
	Number answers	Number answers	Number answers	Number answers	Number answers	Per cent
<u>In the Spring</u>						
Yes.....	9	25	18	15	67	88
No.....	2	3	2	2	9	12
TOTAL.....	11	28	20	17	76	100
<u>In the Fall</u>						
Yes.....	8	21	20	15	64	79
No.....	5	8	2	2	17	21
TOTAL.....	13	29	22	17	81	100

The question on "greening up" was followed by other questions asking for information on the season of year during which crested wheat grass is most palatable. A summary of answers to these questions follows:

TABLE 12. SUMMARY OF ANSWERS TO QUESTION:

"DURING WHAT SEASON OF YEAR IS CRESTED WHEAT GRASS MOST PALATABLE?"

Season	Baker	Gilliam	Sherman	Wasco	Total	
	Number answers	Number answers	Number answers	Number answers	Number answers	Per cent
Spring.....	7	24	15	13	59	68
Summer.....	1	6	2	2	11	13
Fall.....	1	3	5	8	17	19
TOTAL.....	9	33	22	23	87	100

The results show that farmers regard this grass as being most palatable during the late spring and early summer, although a few indicated the early spring, and about one-fourth of those who answered this question indicated the fall. April, May, and June were regarded as the best spring months, and October and November were the best fall months.

TABLE 13. SUMMARY OF ANSWERS TO QUESTION:

"WHAT IS THE BEST TIME OF YEAR TO GRAZE CRESTED WHEAT GRASS?"

Item	Baker	Gilliam	Sherman	Wasco	Total
No. farms reporting.....	13	28	20	13	74
Months:	Number of times mentioned				
March.....	-	8	14	6	28
April.....	3	22	18	8	51
May.....	8	23	13	10	54
June.....	10	14	4	9	37
July.....	5	5	1	4	15
August.....	4	3	3	-	10
September.....	-	5	2	3	10
October.....	2	10	9	4	25
November.....	1	10	8	3	22

A considerable difference of opinion exists among farmers on the question, "Is the palatability of crested wheat grass poorer, equal to, or better than native bunch grass?" A summary of the answers, however, (Table 14) indicates clearly that farmers consider crested wheat grass to be more palatable than native bunch grass in the spring, probably less palatable in the summer, and slightly more palatable in the fall than native bunch grass.

TABLE 14. SUMMARY OF ANSWERS TO QUESTION:

"IS THE PALATABILITY OF CRESTED WHEAT GRASS POORER THAN, EQUAL TO, OR BETTER THAN NATIVE BUNCH GRASS?"

Answer	Baker	Gilliam	Sherman	Wasco	Total	
	Number answers	Number answers	Number answers	Number answers	Number answers	Per cent
<u>Spring:</u>						
Poorer.....	-	5	3	4	12	16
Equal.....	7	10	8	3	28	37
Better.....	4	13	6	12	35	47
TOTAL.....	11	28	17	19	75	100
<u>Summer:</u>						
Poorer.....	-	8	9	7	24	35
Equal.....	6	9	6	5	26	37
Better.....	5	8		6	19	28
TOTAL.....	11	25	15	18	69	100
<u>Fall</u>						
Poorer.....	1	14	7	7	29	39
Equal.....	3	4	4	3	14	18
Better.....	8	10	5	9	32	43
TOTAL	12	28	16	19	75	100

A summary of comments made by farmers, in addition to answers to the specific question, indicate that they are pretty well agreed on palatability and time of year to graze crested wheat grass. It begins growth earlier in the spring than native grasses and stays green as long or longer in the fall. A few Sherman County farmers indicated March as one of the best months to graze crested wheat grass, and implied that the grass might make its greatest contribution early in the spring and late in the fall, when other kinds of pasture are scarce.

In Eastern Oregon the grass matures during the early summer, and remains in a dormant stage until the rains start in the fall. Farmers describe the grass as being harsh, tough, wiry, and brittle, generally less palatable than native grasses during the summer months. One farmer suggested that the grass should be pastured down during the spring and early summer to avoid some of the undesirable effects of this relatively nonpalatable stage. Another farmer indicated that horses would "get along well" on this grass during the summer.

Most farmers will agree that after the grass goes to seed, stock prefer other feed, but if pastured down and not allowed to seed, it stays green longer and keeps its palatability better. Experience with other bunch grasses, when continuously grazed, shows that root growth depends on top growth and that complete destruction of the top always results in the death of the roots and the encroachment of "cheat" or "needle grass." Probably this same story will be told with crested wheat grass. The wise growers therefore are providing two or more pastures, planning to rest one each year.

Carrying capacity. One of the most controversial questions on crested wheat grass has been its carrying capacity. Estimates of carrying capacity range from equal to about three times as much as good native bunch grass. In this study 73 farmers made a comparison between the relative carrying capacity of these two grasses. Ten farmers rated crested wheat grass as being lower, 36 rated it as equal, and 27 rated it higher in carrying capacity than native bunch grass.

TABLE 15. SUMMARY OF ANSWERS TO QUESTION:

"IS THE CARRYING CAPACITY OF CRESTED WHEAT GRASS LOWER,  
EQUAL OR HIGHER THAN NATIVE BUNCH?"

Item	Baker	Gilliam	Sherman	Wasco	Total	
	Number answers	Number answers	Number answers	Number answers	Number answers	Per cent
Lower.....	-	3	3	4	10	14
Equal.....	7	14	9	6	36	49
Higher.....	5	8	8	6	27	37
TOTAL.....	12	25	20	16	73	100

To supplement the above question on carrying capacity, farmers were asked to report the number of acres of crested wheat grass, good native bunch grass, and ordinary native pasture required to graze a mature beef cow during the grazing season. They were also requested to specify the length of the grazing season. The estimates of 42 farmers, adjusted to an eight-months grazing season, are summarized in Table 16.

TABLE 16. SUMMARY OF ANSWERS TO QUESTION:

"HOW MANY ACRES OF THE DIFFERENT KINDS OF PASTURE ARE  
REQUIRED TO CARRY ONE MATURE COW THROUGH THE GRAZING SEASON?"  
(THE DATA ARE ADJUSTED TO AN EIGHT-MONTHS GRAZING SEASON)

Item	Crested wheat grass			Good native bunch grass			Ordinary native pasture		
	No. of farms	Acres per animal month	Acres per season	No. of farms	Acres per animal month	Acres per season	No. of farms	Acres per animal month	Acres per season
Baker.....	10	1.0	8.0	12	1.0	8.0	6	1.2	9.6
Gilliam.....	14	1.4	11.2	20	2.5	20.3	20	3.1	25.0
Sherman.....	12	1.1	8.8	16	1.6	12.8	16	2.3	18.4
Wasco.....	6	1.1	8.8	12	2.6	20.8	15	3.0	24.0
WEIGHTED AVERAGE	42	1.2	9.7	60	2.0	16.8	57	2.6	20.8

According to these results farmers estimate that it requires 9.7 acres of crested wheat grass, 16.8 acres of good native bunch grass, and 20.8 acres of ordinary native pasture to graze a mature cow through an eight-months grazing season. The estimated carrying capacity of these three kinds of pasture is higher in Baker County and lower in Gilliam County than the average for the four counties. If Baker County is omitted from the weighted average, the carrying capacity in the three Columbia Basin Counties then becomes 10.1 acres for crested wheat grass, 17.9 acres for native bunch grass, and 22.4 acres for ordinary native pasture.

The actual rate of grazing on 40 fields of crested wheat grass is shown in Table 17. The results are from fields that were grazed separately and apart from other kinds of pasture. The data, therefore, show the number of acres of this grass actually used by farmers to graze the equivalent of one cow for one month, and for an eight-months grazing season.

TABLE 17. THE NUMBER OF ACRES USED, IN 1938, TO GRAZE THE EQUIVALENT OF ONE COW FOR AN EIGHT-MONTHS GRAZING SEASON, BY COUNTY

County	No. fields	Acres	No. animal months grazing	Acres required per animal unit month	Acres required for 8-months grazing
Baker.....	7	196	162	1.20	9.6
Gilliam.....	16	788	451	1.74	13.9
Sherman.....	9	267	185	1.45	11.6
Wasco.....	8	268	269	.99	7.9
TOTAL.....	40	1,519	1,067	1.42	11.4

The results indicate that farmers pastured crested wheat grass in 1938 at the rate of 1.42 acres per cow-month, or 11.4 acres per cow for an eight-months grazing season. The rate varies between counties, from 7.9 acres in Wasco County to 13.9 acres in Gilliam County. This information on actual use compares favorably with farmers' estimates, as presented in Table 16.

The results on grazing, especially those on carrying capacity, are regarded as tentative, pending more grazing experience and improved methods of measuring carrying capacity. Carrying capacity based on farmers' estimates and actual use may be high, reflecting a tendency on the part of some farmers to utilize pasture somewhat above its normal capacity as estimated on a sustained-yield basis. On the other hand, it is probable that crested wheat grass will improve as stands become better established. This can be expected if farmers avoid grazing practices that have killed many stands of native bunch grass. Crested wheat grass is closely related to native bunch and although it is apparently harder to kill and will probably withstand grazing better, it is almost certain that continuous, season-long use, maintained year after year, will result in its death. Those who regard the grass highly and who do not like such unpleasant death scenes can avoid them by pasturing the various fields in rotation, letting each field get into the heading stage on alternate years.