THE CHEATGRASS PROBLEM
IN OREGON

Oregon State System of Higher Education
Federal Cooperative Extension Service
Oregon State College
Corvallis

Extension Bulletin 668
June 1946
## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>3</td>
</tr>
<tr>
<td>I. History and Characteristics of Cheatgrass</td>
<td>5</td>
</tr>
<tr>
<td>II. Cheatgrass as a Forage Plant</td>
<td>9</td>
</tr>
<tr>
<td>Productivity</td>
<td>9</td>
</tr>
<tr>
<td>Palatability</td>
<td>10</td>
</tr>
<tr>
<td>Feed Value</td>
<td>12</td>
</tr>
<tr>
<td>Advantages and Disadvantages</td>
<td>13</td>
</tr>
<tr>
<td>III. Cheatgrass as a Fire Hazard</td>
<td>19</td>
</tr>
<tr>
<td>Oregon Grass Fires Associated With Cheatgrass</td>
<td>19</td>
</tr>
<tr>
<td>Fires Cause Losses Other Than Money</td>
<td>20</td>
</tr>
<tr>
<td>Proposals for Fire Prevention on Cheatgrass Ranges</td>
<td>21</td>
</tr>
<tr>
<td>Firebreak System Would Reduce Losses</td>
<td>27</td>
</tr>
<tr>
<td>Fire Control Must Be Preventive</td>
<td>28</td>
</tr>
<tr>
<td>IV. Cheatgrass in Relation to Soil Erosion and Fertility</td>
<td>31</td>
</tr>
<tr>
<td>Erosion Reduces Range Productivity</td>
<td>32</td>
</tr>
<tr>
<td>Cheatgrass Affords Poor Erosion Protection</td>
<td>33</td>
</tr>
<tr>
<td>V. Possible Courses of Action</td>
<td>37</td>
</tr>
<tr>
<td>Reseeding—How—When—Where—With What?</td>
<td>37</td>
</tr>
<tr>
<td>Early Spring Operations Face Difficult Adjustment</td>
<td>42</td>
</tr>
<tr>
<td>More Dual Use Indicated</td>
<td>42</td>
</tr>
<tr>
<td>Early Selling of Beef Might Help Some</td>
<td>43</td>
</tr>
<tr>
<td>VI. Summary</td>
<td>45</td>
</tr>
</tbody>
</table>

### Acknowledgments

The authors thank the following who read the manuscript and aided with valuable suggestions:

- G. D. Pickford, In Charge Range Research, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.
- Leo Anderson, State Soil Conservationist, Crees Building, Corvallis, Oregon.
- Kenneth Ikeler, Regional Grazier, Burns, Oregon.
- Dr. D. D. Hill, Head of Department of Farm Crops, Oregon State College.
- Don Robbins, Regional Examiner, U. S. Grazing Service.

Illustration on cover—

Figure 1. Hills southwest of Malheur River in Malheur County. Formerly in perennial grasses, now mostly cheatgrass. Photograph by Grazing Service, Nov. 1940.
FOREWORD

In recent years, cheatgrass brome (Bromus tectorum), also known as cheat, downy chess, bronco grass, Junegrass, Mormon oats, and by other local names, has been the most widely discussed plant on intermountain ranges of the Pacific Northwest. (Hereafter, in this bulletin, the name will be shortened to cheatgrass.) Much of this discussion has revolved around the theme that cheatgrass harms ranges by driving out the native grasses. It has slowly taken over millions of acres of land, and stockmen have had keen interest in the relative advantages of cheatgrass and the perennial grasses.

There is a lively difference of opinion about the grass among livestock men and among professional people connected with the livestock industry. Some range users say that cheat produces more feed than was produced by the native forage plants it replaced. Many believe it produces at least an equal amount. Others give it little value. Some find it useful only for early spring grazing; others point to successful summer use; others say it doesn’t matter, we have cheatgrass now and always will have it; while an occasional livestock man says he is getting rid of his cheatgrass.

These contradictory opinions indicate a variable nature of cheatgrass under differing conditions and a lack of understanding of the grass. It is hoped here to set forth such facts as are commonly known, to bring out additional facts not so well known, and to discuss various conclusions that these facts warrant. The writers hope that this bulletin may stimulate discussion and observation by cheatgrass users so that in time a unified public sentiment may make possible a definite program for dealing with the cheatgrass ranges.

The cheatgrass problem is tied closely to other things. To enable ready reference to any one part of the bulletin, these
subjects, though closely related, are separated into parts as follows:

1. History and Characteristics of Cheatgrass.
2. Cheatgrass as a Forage Plant.
3. Cheatgrass as a Fire Hazard.
5. Possible Courses of Action.

At the cost of some repetition, each of these subjects is treated separately so that a reader wishing, for example, to see what is said about cheatgrass fires may read only that section if he chooses.

Figure 2. Cheatgrass is beginning to fill in the vacant places on the range to the right of the fence; range on the left is nearly free of cheatgrass. Gilliam County.
The Cheatgrass Problem in Oregon

By
KENNETH PLATT* 
and
E. R. JACKMAN*

I. HISTORY AND CHARACTERISTICS 
OF CHEATGRASS

CHEATGRASS is not native to Oregon. It is a conquering invader from the Mediterranean that has adopted infiltration tactics that would do credit to a well-trained Asiatic militarist. It comes into a range country unobtrusively and, at first, is content to live on the waste places—bare spots around corrals, unoccupied highway shoulders, and badger mounds.

Although present in Oregon for at least 50 years, it is only within the past 30 years that it has abandoned its role of ally, has become an aggressor, and is now firmly entrenched on at least ten million acres of eastern Oregon.

Cheatgrass is found mostly in the 6- to 16-inch rainfall areas and is more prevalent on south slopes, on lands adjacent to water, and on those low elevation ranges that are subjected to heavy use in the early spring. The grass is found throughout Oregon, but is more at home in eastern Oregon. It is less aggressive at elevations over 5,000 feet. It will grow on any soil, but does not like heavy adobe soils so well as more open types.

Cheatgrass is an annual. The entire plant dies each year as soon as seed is mature. To make a good growth, it must come up in the fall. Dry falls followed by cold springs result in scanty growth. Opposite conditions result in heavy production on good soils. It can withstand any ordinary winter weather, and the fact that it keeps spreading during drought years or heavy use of range shows that it can exist under conditions fatal to the perennial range grasses.

The seeds bear beards that become stiff and harsh as the seeds ripen and the point of attachment of the seeds becomes needle-sharp at maturity. When the plants are young, the foliage is rather attractive to livestock, but when the seeds are ripe, their sharp points and rough beards are so formidable that stock avoid the grass if any other feed is available. If forced to eat it, many cattle suffer from sore mouths and many sheep have eye injuries, resulting in serious loss of flesh and occasionally death.

In midsummer, most of the seeds drop to the ground. When fall rains soften the dead leaves and stems, stock again eat the plants with some relish although at this stage the dead growth is very low in feed value.

When dry, the somewhat woolly foliage is mingled with the numerous brushy seed beards so that the whole forms a fluffy, combustible mass quite different from other range grasses. It burns far

Figure 3. Cheatgrass sometimes leads to severe mouth and throat infections.

Figure 4. Horses on typical cheatgrass range. *Grazing Service Photograph.*
more rapidly and makes a hotter fire. The ripe grass has an almost explosive quality that makes a fire hard to control.

Cheatgrass normally produces heavy crops of seed and usually no season is too bad to prevent some seed formation. It thus has an advantage over the good perennial bunchgrasses which very rarely have such high seed yields per acre. Excessive grazing or dry weather may keep perennial grasses from making any seed, whereas the cheatgrass practically always produces enough seed to bring on another crop the next year. Seed of the later maturing perennial grasses often has a far lower germination than that of the cheatgrass.

The seed is susceptible to smut; and in favorable smut seasons it is common to find 75 per cent or more of the heads smutty. Feeding experiments with smuts failed to prove them dangerous to livestock; however, some stockmen think that if animals are forced to graze it while the smut-filled seeds are still on the plant, it may cause severe loss of flesh, abortions, and even death. At any rate, livestock avoid the smutty grass if there is anything else available. The smut is rarely, if ever, severe enough to kill a stand of cheat, but the grass is often thinner following years of extreme smutting.

The very heavy seed-setting habit usually results in a complete carpet of seeds over all the ground, followed by a solid cover of the grass the next year. This is in marked contrast to the partial cover given by the spaced clumps of bunchgrass. It is only in the beginning stages of cheatgrass encroachment that scattering clumps of the grass are found; in the end, the open spaces will all be filled with cheatgrass.

As with garlic, there is no such thing as a little cheatgrass.

Cheat doesn't drive, but it follows.

It cannot, strictly speaking, drive out bunchgrass, as many claim. It is only when the bunchgrass dies, or is thinned or killed by fire, grazing, erosion, insects, drought, or other causes, that the cheatgrass comes in. It doesn't drive out the bunchgrass; it follows it.
Figure 5. Sheep on a cheatgrass range in October. *Grazing Service Photograph.*

Figure 6. Very heavy stand of cheatgrass in Jefferson County. Note solid mass of fluffy vegetation. *Soil Conservation Service Photograph.*
II. CHEATGRASS AS A FORAGE PLANT

Productivity

It is likely that, in the average year, cheatgrass ranges produce as much feed per acre as do adjacent ranges that still have fair stands of native bunchgrasses. It is also probable that a thick stand of the large native bunchgrass (bluebunch wheatgrass) or a good stand of crested wheatgrass produces more feed than cheatgrass. Original stands of grass are usually made up of at least three native grasses and often more. The three most common in Oregon are bluebunch wheatgrass, Idaho fescue, and little bluegrass. In addition, there are usually some browse plants, some less common grasses, and numerous weeds. Most of these other plants are less productive than the larger bluebunch wheatgrass, so the total season’s yield is probably no larger than that from the cheatgrass. In addition, the cheatgrass has a habit of occupying all or nearly all of the land, whereas the native grasses often leave bare spots.

From the standpoint of usable feed, the normal bunchgrass range, with its long list of plants, is more usable than any cheatgrass range largely made up of the one plant.

The big headache with the cheatgrass, however, is that the yield varies so much from year to year. Reports have been published* showing that in one extreme case the grass produced 200 times as much feed in a good year as in a poor one. While such a wide difference is not common, plenty of Oregon ranchers will testify that a dry fall followed by a cold, dry spring may cut the usual production down to one-tenth of normal. In such a year, the cheatgrass heads out, as D. E. Richards of Prairie City expresses it, when it is only “half-a-bite high.” Obviously, a rancher cannot keep 200 cows one year and 20 the next, so dependence solely upon cheatgrass may make a man a bad credit risk. The fluctuations in yield with native bunchgrass are only a fraction of those observed with cheatgrass. Some financial agencies lend less money per acre and per head of livestock to an operator dependent solely upon cheatgrass.

In addition to being more stable feed producers, most perennials have the advantage of carrying over a fair proportion of their feed value from an abundant year into the following spring when it may serve to stave off serious livestock losses in the final critical weeks before new feed becomes plentiful. The dead top growth alone has little value, but mixed with new growth, or aided by a protein supplement,

it may be valuable. The carry-over value of cheatgrass in this re-
spect is negligible. Like a good manager, the perennials salt away a
reserve in the good years by storing food in the roots. This stored
food compares with money in the bank. An annual such as cheat
wastes its substance in riotous living in the good year and may be
dead broke in the bad year to follow.

Further, where growing conditions commonly fluctuate widely
from year to year, the man dependent chiefly on cheatgrass ranges
either must carry a heavy overhead of excess range in the good years,
or must face the management nightmare of fluctuating his herd num-
bers in keeping with the vagaries of the seasons. For the man with
perennial range grasses, this problem is less severe.

The useful season of cheatgrass on many ranges is much shorter
than that of the perennials. This is especially true on sheep ranges
as sheep do poorly on cheatgrass after it begins to form seed heads.
Cheatgrass produces good feed for lambs from 3 to 8 weeks, whereas
the perennial grasses can be pastured about twice as long. Cheat-
grass often starts later in the spring than perennial grasses.

Smutting may reduce the late-season value of cheatgrass.

A live cigarette
but—and you're
all out of range.

As soon as cheat is ripe, it forms a summer-long
fire hazard, and the owner of a cheat range who de-
pends on summer feed from it keeps an agonized
clutch on a rabbit foot.

Where ranges must be used season-long, cheatgrass is generally
much less satisfactory feed through the summer months than a good
native perennial range. The sharp seeds make the plant nearly un-
usable, and in addition, cheat matures early and uniformly and all of
the feed is ripe at once. Recurring fires are likely to kill the browse
plants and later maturing grasses and weeds, leaving straight cheat.

In rainy years, cheat makes a great deal of regrowth if kept
eaten down. The total yield for the season is thus far larger if the
early feed is used.* In dry years there is very little regrowth but
there is usually enough so that most of the plants
manage to head out and bear seed. Thus in good
cheat years it pays well to graze the grass early and
heavily. This is in direct contrast to management of
the perennials. Early heavy use will eventually kill them. If one uses
the range to get the most from the cheat, he kills the perennial grasses.

Palatability

For beef cattle and range sheep, palatability is less important
than for dairy cows. Stock prefer certain plants; but if these aren't

---

* Fleming, Shipley, and Miller, Bronco Grass on Nevada Ranges, Nevada Experiment
Station Bulletin 159, 1942.
available, they eat, within reason, what they can find. Thus they do pretty well on browse plants or weeds that they would scorn if they had a nice clover pasture to enjoy. For this reason, it is likely that too much attention has been given to palatability ratings, especially since it is a positive disadvantage to a plant to be too palatable. If the stock like it so well that they hunt a range over for it, and camp on it until it is eaten into the ground, the plant will shortly disappear.

Stock like cheatgrass in the early spring and eat it with relish until it begins to mature in late May or early June. Sheep tire of it first, and they will usually avoid it entirely during the summer. After it matures, cattle prefer other feed, but eat some of it. After the needlelike seeds drop, cattle again feed on it rather heavily. When rains come and the seeds sprout, livestock again relish the cheatgrass;
and in open winters they feed on both old and new growth all winter long. The seeds are nutritious if they can be eaten. Livestock eat them readily after fall rains.

The cheatgrass thus has limited seasons of use as compared with the perennial grasses. It is excellent in the spring and may be excellent in the fall if early rains arrive. For sheep and dairy cattle it is almost useless during July and of only limited use in August and September.

If stock have only cheatgrass to live on through the summer, they are likely to start to lose weight earlier than on a bunchgrass range; and they usually come in pretty thin in the fall.

If the feed is plentiful, cattle and horses do well on cheatgrass throughout most of the season. Stockmen say that cheatgrass ranges should be better-watered than bunchgrass ranges in order to get the same gains. In general, older stock make best use of mature cheatgrass, because their harder mouths are less injured by the seeds than is the case with younger stock, and because the mature plant does not at all meet the nutrition needs of young animals. Ripe grass is poor food for any animal, but ripe cheatgrass is disastrous for young animals. Weaner calves have been found starving because large quantities of cheatgrass seed lodged in the soft tissues between the lower lip and jaw bone prevented further eating. In older stock these tissues become progressively harder, and cheatgrass injury is lessened accordingly. Cheek and tongue-root tissues remain subject to such injury at all ages.

The weakest spot in many eastern Oregon ranges is their inability to hold in the fall the gains made by livestock in spring and summer. Studies at the Squaw Butte-Harney Cooperative Range and Livestock Station near Burns, confirmed by similar studies in other states, have indicated that this failure is due largely to lack of sufficient protein in mature grasses, whereas most browse plants are rich in protein. Cheatgrass ranges generally are browse-poor especially if they have been burned over repeatedly.

Mature cheatgrass has less fiber than most of the native grasses. Cattle frequently prefer the dry cheatgrass to bunchgrass that is equally dry.

**Feed Value**

In studies made in Nevada,* cheatgrass was about equal in feeding value to the perennial grasses. All grasses were high in protein.

---

*For an excellent and detailed report on the feed value of cheatgrass, see Nevada Agricultural Experiment Station Bulletin 159, *Bronco Grass (Bromus Tectorum) on Nevada Ranges*, Fleming, Shipley, and Miller, 1942.*
in the early spring, and the percentage dropped rapidly from about 13 per cent in April to 5 per cent by July, followed by a further decline to 3½ per cent by September. If rains came, of course, the new green growth was again high in protein, but the old grass continued to decline in feed value. Work in Washington and other states shows that dry grass left standing on the range is about like dry straw in feed value. None of the grasses, when mature, will furnish enough protein to maintain weight on a beef animal; and cheatgrass is no better and no worse than the others. Dry mature cheatgrass loses more of its nutrients from fall and winter rains and snows than do the perennials. Snow mats it down and makes it unavailable.

Many Oregon ranchers have used cheatgrass as a hay crop. It makes good nutritious hay if cut early—just as it is heading. If one waits until the seeds have formed, the hay is low in feed value; and if any ripe seeds are present, it is difficult for stock to eat. Sheep fed over-ripe cheatgrass hay develop eye injuries, and cattle often have sore mouths. This is especially serious with young stock. The immature seeds in hay are even worse than the mature, because if the grass is cut after the seeds have formed, the young seeds dry into harder and sharper needles than is the case with mature seed. They do not tend to shatter so much, also, thereby remaining through all of the hay.

Cheatgrass is particularly undesirable in alfalfa fields. It does not actually kill out the alfalfa, but as the alfalfa dies because of wilt or other causes, the cheatgrass fills in. It is earlier than alfalfa, and it usually heads before the first cutting is ready. At that time of year (the month of May in the lower elevations), it is often poor haying weather, and very early cutting injures alfalfa and reduces yields. If cutting is delayed until the grass seeds have formed, the hay is very low in feeding value and may be dangerous to feed. Such hay should never be chopped. If fed long, the livestock can work it over, gradually sifting the needlelike seeds to the bottom of the rack or to the ground. A hammer mill may destroy many of the seeds; but if the hay is chopped, the needles are scattered all through the hay and animals are forced to eat them. Cheatgrass can usually be kept out of alfalfa fields by seeding alfalfa-grass mixtures instead of straight alfalfa.

Advantages and disadvantages

So far, the cheatgrass case doesn’t look so bad. It will grow almost anywhere, will live under most conditions that kill other grasses, is reasonably palatable during most of the grazing season, and withstands grazing far better than the perennials. Why then argue about
it? Why not welcome it as a godsend to the range? Actually cheatgrass has been a godsend in many areas in the sense that it has held up the volume of feed—though admittedly of somewhat lower quality—over a period that, without the cheatgrass, would have seen either very severe denudation of large range areas, or drastic reduction of livestock operations, or both. In this sense it is still a godsend, for on millions of acres only a fraction of the present grazing load could be supported by the existing feeds other than cheatgrass.

The cheat has still another value, although it is a sort of left-handed virtue. Over millions of acres sagebrush dominates. Studies at Squaw Butte, by R. G. Johnson and others, and confirmed by work at other stations*, show that a sagebrush range will produce twice as much grass if the sage is removed. On many eastern Oregon ranges burning is the only feasible way at present to get rid of the sage. It happens that cheatgrass carries fire better than any other range grass, so its presence has resulted in fires that cleared the land of sagebrush and doubled the grass production through allowing the grass to use the moisture that the sage formerly used. Unfortunately rabbitbrush (Chrysothamnus species) will usually withstand fires and most species have very little forage value. Repeated fires often result in almost worthless rabbitbrush ranges. Fire also kills the browse.

Aside from the fire hazard and the year-to-year variations in

Figure 9. Repeated fires have destroyed practically all of the perennial grasses and most of the sagebrush on this range leaving cheatgrass mainly. Grazing Service Photograph.

yield, probably the greatest single objection to the cheatgrass is that a range country covered by an annual is in a highly precarious condition. A range, well covered by perennials, is a stable asset that may exist for all time. An annual through its very nature is a fair weather friend and may desert the owner right when he needs it most. Occasionally someone says, "Nothing can hurt a cheatgrass range." This is not borne out by the observations of the writers.

The same conditions that killed the perennials in the first place, if operative for a long time, are likely to kill the cheatgrass. It is probable that cheatgrass is just the first of a number of changes as a range degenerates. While descending stairs, one may pause a bit on each step, but each succeeding step is downward. Perennials are at the top; then comes cheatgrass; then, unless some change occurs, come such things as sunflowers, Russian thistle, mustards, ripgut brome, annual wild ryegrass, and low growing annual weeds of little value. The writers have noticed these downward steps on a large range area between the Boise and Payette Rivers, west of Boise, Idaho, where early spring grazing was extremely congested for many

Figure 10. Range near the Malheur River. Frequent burning has destroyed nearly all of the vegetation and has left the soil bare and ready for erosion. If the burn comes early, it may kill most of the cheatgrass seeds; if it comes after they have dropped to the ground, the first fall rains will usually carpet a cheatgrass range such as this with a mat of the young grass. Grazing Service Photograph.
years. Following destruction of virtually all perennials save the highly resistant little bluegrass, cheatgrass covered most of this area. Continued heavy spring use plus recurrent fires caused invasions of mustards and Russian thistle. Where this has occurred, the carrying capacity has dropped to very low levels and the forage, has only a limited, short-season value. Similar areas are found along the state highway between Huntington and Ontario, Oregon, and along the Columbia River. This downward trend, from cheat to weeds, is especially noticeable wherever range fires have been frequent.

It does not matter much what causes the downhill course. The perennials may have been killed by a combination of overuse, erosion, untimely use, fire, drought, or even insect damage. The point is, that if these things are still operative, the cheatgrass is only a pause on one of the downward steps. Cheat invasion is thus a red flag signaling that a range wreck may be ahead. Forage cover seldom remains constant under use. It gets better or worse.

This leads to the question, “Can a cheatgrass range be improved?” If one already has a solid stand of cheatgrass, there is no way to make more of it grow. Each year millions of seeds are scattered per acre, hundreds of them to every square foot, and the resulting cheatgrass does its strenuous best to produce. There are no known improved strains of the grass, so there isn’t any chance to improve the cheatgrass itself. Perhaps the stock can be scattered better by fencing and water developments. Perhaps some water can be led out of canyons and spread on the range; but so far as the grass itself is concerned, a range taken over completely by it has been “improved” as well as the cheatgrass knows how. There is no way to make it produce more than it is already producing.

If the range is mostly cheat but still has some perennials, is it possible to increase the latter? To some extent, yes, but it is a long pull and cannot be accomplished except by a change of grazing practices. Cheat yields best if pastured early. This kind of use will kill the perennials. The cheat favors fire which kills the browse and some of the good weeds and grasses. If the range is completely deferred to bring back the perennials, the fire hazard is multiplied.

Every land owner wants to leave his land better than when it came to him and he will try to do so if he can figure out how to make a living at the same time. But a full stand of cheatgrass has him in the position of the Irishman who couldn’t get his new shoes on till he had worn them a time or two.

Nearly every rancher has some land not yet taken by cheat. These lands should certainly be kept cheatgrass free by managing
the grazing to suit the grass. Alternate year use, deferred grazing, spreading the stock as much as possible, providing rye or crested wheatgrass for early spring, seeding of bare spots, and fire prevention will all help.* A man who owns both kinds of range and despair of improving his cheatgrass range can help his bunchgrass by always using his cheat for early spring feed, thereby deferring the bunchgrass every year, which is the way to get the most from the cheatgrass.

Figures 11, 12, and 13. An airplane view of a cheatgrass fire in 1940. In years of good cheatgrass growth such fires are very hard to stop. *Graying Service Photograph.*
III. CHEATGRASS AS A FIRE HAZARD

Cheatgrass fires have been mentioned previously. In a city a certain building may be useful enough, but it may be condemned and torn down solely because it is a menace as a fire hazard. Cheatgrass is just such a menace. The native forage plants have a long ripening period and many of the browse plants remain green all season. Cheat ripens early and all of it ripens at about the same time. Its feathery, fluffy type of growth burns with fearful rapidity. Moreover it commonly covers all of the land leaving no spaces to serve as natural fireguards. The fire generates a wind that carries burning embers with it, sweeps across roads and creeks, and makes cheat fires difficult to control.

Oregon Grass Fires Closely Associated With Cheatgrass

During the summers of 1941-42-43, grass fires on Oregon grazing districts swept over an aggregate of 800,000 acres of public and private lands. In 1942-43 it was possible to classify 583,320 burned-over acres into cheat and noncheat blazes. In these grazing districts cheat occupied only 20 per cent of the total district area so if the fires just occurred at random, only 20 per cent of them should have been cheat fires. Actually 99 per cent of the burned acreage was cheatgrass. Statistically, a cheat range is thus about 500 times more likely to burn than a non-cheat range.

The comparative degree of recurrence of fires over the same ground on cheatgrass and bunchgrass areas is a further indication of the fact that a range grass fire in Oregon has almost come to mean a cheatgrass fire. Of 13 second burn fires reported in 1942-43, 12 occurred on cheatgrass, and approximately 3 in every 4 of the 250 new fires occurred in cheatgrass. Similarly, while noncheat fires destroyed roughly 1 per cent of the total acreage lost in all

![Figure 14. Such sights are common in the cheatgrass areas. The grass fires cause losses in time, buildings, forage, and fences.](image)
1942-43 fires, the reburn loss on noncheat areas was only 0.00007 per cent of the total reburn.

The evidence is clear that the problem of grass range fires in eastern Oregon arises almost entirely because of cheatgrass. Casual observation of range fire occurrence in other states indicates a similar relationship. In many years bunchgrass stays green so long that it will not burn readily until the real fire season has passed. This statement is nearly always true of crested wheatgrass. In mixed wheat and range areas, the crested wheat is especially valuable because it remains green until after the wheat has been harvested.

**Fires Cause Losses Other Than Money**

These fires occurring year after year add up to huge economic losses and add greatly to the hazards of livestock operations. Some of the losses include:

1. The necessity for having men and equipment available at all times for fire fighting over hundreds of square miles of eastern Oregon and adjacent states. This is especially important in times of manpower and equipment shortages.
2. Loss of work on farms and ranches when it is essential for all hands for miles around to quit work and fight fires.
3. Loss of haystacks, crops, fences, and occasionally livestock and buildings.

![Figure 15. Erosion on cheatgrass range following fire. Soil Conservation Service Photograph:](image-url)
Figure 16. Cheatgrass range badly overgrazed—on right of fence, Jefferson County. Such grazing reduces fire hazard but is hard on the livestock, kills the browse plants, and invites erosion.

4. Loss of forage sometimes desperately needed.
5. Severe loss of land by erosion after a fire.

Proposals for Fire Prevention on Cheatgrass Ranges

Many proposals have been made for dealing with the cheatgrass range fire problem of which the following six are significant.

First proposal: that the existing state of cheatgrass be accepted, and that the fire hazard be reduced by heavier grazing.

Weaknesses of this plan are:

1. Cheatgrass on any one area may be as much as 200 times as productive in one year as in another. Numbers of livestock could not possibly be fluctuated in that way. Fires are nearly always worse in years when the cheatgrass produces heavily.

2. In most years a much greater number of livestock would be needed to keep down the early spring volume of cheatgrass growth than could be supported economically on the feed available for the balance of the season.

3. Even where cheatgrass is very heavily grazed, enough of the grass usually remains to carry a fire.
4. Range grazed as closely as here proposed would not produce livestock profitably.
5. Browse values would be lost entirely under this treatment.
6. At best, the method would aid merely in fire control and would gain nothing in range restoration.
7. Occasional ranges are grazed so closely that nearly all growth is removed and when that happens erosion is frequently very bad.
8. Cheatgrass refuses to stay under such management and its place is filled by plants of still lower value.

Figure 17. This old homestead is in the middle of a badly overgrazed range in northern Morrow County. Soil Conservation Service Photograph.

Second proposal: that cheatgrass areas be stocked and grazed seasonally in such a manner as to give the surviving native perennials the best possible chance to recuperate and reclaim the range, thus eventually removing the cheatgrass problem entirely.

This method is workable on some ranges and has been successful. Other ranges have so few perennials left that the process takes many years. From a fire-control viewpoint, the method has the weakness of permitting accumulation of large volumes of ungrazed cheatgrass each year, thereby accentuating the fire hazard.

Third proposal: that expansion of cheatgrass fires be broken up by maintained firebreaks, consisting either of strips tilled to prevent plant growth or of strips graded to produce both a plant-free area and a travel route for fire-fighting equipment.
Figure 18. One type of firebreak. A firebreak as narrow as this is often ineffective in a heavy stand of cheatgrass.

Figure 19. The Heater fireplow, an all-metal tool with which the firebreak in Figure 18 was made.
This method has proved fairly effective for immediate applica-
tion but as a long-time method presents serious problems of main-
tenance cost and erosion control on the bare strips. It requires a
heavy machinery investment and has the disad-
vantage that strips effective one year may be inef-
flective the next because of more dead material or
better fire weather. This method used alone assumes
acceptance of the present state of cheatgrass on the range.

*Fourth proposal:* that firebreaks be established by controlled
burning with flame throwers before the fire season.

This method would be superior to tilled firebreaks in rough
country in that the strips could be placed to better advantage, very
little machinery would be required, and the strips
could be widened or increased in number from year
to year depending upon the fire hazard. The method
would require yearly renewal, presumably forever,
and would presuppose perpetual presence of the cheat problem. Ero-
sion would be less than with tilled firebreaks.

Figure 20. This wide firebreak stopped a cheatgrass fire in Umatilla County
in 1943.

*Fifth proposal:* that cheatgrass areas be broken at suitable in-
tervals with strip plantings of fire-resistant species, such as crested
wheatgrass.

Strip plantings, if established in good stand, form effective fire-
breaks. Their efficiency has been demonstrated by many fires that
have died out abruptly against these plantings.
A good example is along U. S. Highway 30 between Pendleton and Stanfield where the State Highway Commission seeded crested wheatgrass in 1936. Since then, few roadside fires have occurred there, although fires have been frequent along that highway farther west. The real problem with this method is how to get the necessary plantings successfully established at reasonable cost. Large areas of ex-

Figures 21 and 22. Two views of a crested wheatgrass planting that stopped a large range grass fire on the property of John Troedson of Ione in the summer of 1944. This fire hurried over all of the land in view except that with the crested wheatgrass.
Extremely steep, rough, or stony land present obstacles to tillage seeding. A successful seeding for firebreak purposes must be thick enough to dominate cheatgrass almost to the point of exclusion and only tillage before seeding can be depended upon to accomplish this. Further, it is usually necessary to protect new seedings for a year or two or the young plants may be trampled out or pulled up before they can become rooted. If the range is used in the early spring, the stock often tend to camp upon the seeded grasses, resulting in the destruction of the grass. Possibly portable electric fences could be used to protect seeded areas during the year following seeding.

Rodents and jack rabbits tend to work young grasses heavily and seeded strips would have to be large enough so that the concentrations of these pests would not kill the grass before it became established. Poisoning would be a necessary part of strip seeding.

Sixth proposal: that the cheat areas be reseeded to grasses that are not such bad fire hazards.

This proposal should be studied thoroughly in each major fire area. Since this would involve the entire cheatgrass question, it is given more complete treatment under “Possible Seeding Long-Courses of Action,” beginning on page 37.

Reseeding would probably cost $1.50 to $2 per acre for seed, materials, and labor, but it might be cheaper than fire control, at least on certain high-hazard areas. In
Oregon grazing districts, fire-control costs from Grazing Service funds, contributions of labor, equipment and materials, and the value of forage lost add up to about 10 cents per year for each acre in the fire-hazard area. Thus if present costs represent reasonable efficiency in fire control, we could expect to accumulate fire-control costs of about $2 per protected acre over a 20-year period. If nothing is done to replace the cheatgrass, the fire control cost presumably will be a yearly tax forever, whereas if a successful seeding could be established at a cost of $2 an acre, this cost could be written off at the end of 20 years.

Firebreak System Would Greatly Reduce Losses

Since the bulk of cheatgrass fire loss has resulted more from the great scope of relatively few large fires (see Table 1) than from the aggregate scope of many small fires, a firebreak adequate to hold any one fire to a relatively small area would automatically reduce fire losses. Such a control system need not be so intensive as might seem necessary at first thought.

To illustrate, Table 1 shows that nearly 81.5 per cent of the total area burned by range fires on Oregon grazing districts during

Figure 24. In Jefferson County an example of a dense stand of cheatgrass on the left, and a good stand of crested wheatgrass on the right. Seeded in 1938, neither grass has encroached on the other up to 1944. Photograph by K. W. Sawyer.
1942-43 was covered by only 9.1 per cent of the total fires. The fires in this 9.1 per cent averaged 19,789 acres each. If these 19,789-acre burned areas had each been quartered by effective firebreaks, the expectation of loss would have been reduced to 2,474 acres for any one area, or one-eighth the area burned in the absence of such firebreaks assuming the fire traveled twice as fast on its main axis as on its cross axis.* The reason for this reduction in expected fire loss by double the proportion of subdivision of the fire area is demonstrated in Figure 26.

Fire Control Must Be Preventive

Range fire control will be satisfactory only when it is automatically preventive. That is, public opinion must force such devices as fire-resistant plantings along every highway right-of-way, controlled burning practices, locomotive spark arresters, and other measures to the point where very few range fires will be man-caused. At the same time we must construct such fire trails, truck trails, strip plantings, water depots, fire lookouts, fire tool caches, fire-fighting equipment centers, and local range-fire-control organizations as will be likely to limit each fire to a small area.

To the authors it seems that the most hopeful of these devices is that of planting better grasses whenever feasible, at least in the

Figure 25. Cheatgrass range fire, Jefferson County.

*A study of many Oregon range fires shows an approximate average 2 to 1 relationship in actual experience.
most hazardous fire areas, since that is the only solution that goes to the root of the problem. Where management methods can be worked out to bring back the native perennial cover, it is preferable. The return of the native grasses is slow, and planting is so expensive that cheat and its related fire control job will be with us for many years.

Figure 26. Firebreaks will reduce fire loss by double the proportion of subdivision of the fire area.
Table 1. Size and Distribution of Fire, by Cheatgrass and Noncheatgrass Areas, Oregon Grazing Districts, 1942-43.

<table>
<thead>
<tr>
<th>Size of fires</th>
<th>Number of fires and acreage burned</th>
<th>Per cent of fires and acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Location</td>
<td>Number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1942</td>
</tr>
<tr>
<td>Up to .25</td>
<td>C</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>.26 to 9.99</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>.26 to 9.99</td>
<td>10</td>
</tr>
<tr>
<td>10 to 100</td>
<td>C</td>
<td>10</td>
</tr>
<tr>
<td>101 to 300</td>
<td>C</td>
<td>29</td>
</tr>
<tr>
<td>301 to 5,000</td>
<td>C</td>
<td>27</td>
</tr>
<tr>
<td>5,001 to 15,000</td>
<td>C</td>
<td>10</td>
</tr>
<tr>
<td>Over 15,000</td>
<td>C</td>
<td>8</td>
</tr>
<tr>
<td>Total 300 acres or less</td>
<td>C</td>
<td>48</td>
</tr>
<tr>
<td>Total over 300 acres</td>
<td>C</td>
<td>45</td>
</tr>
<tr>
<td>Total 5,000 acres or less</td>
<td>C</td>
<td>75</td>
</tr>
<tr>
<td>Total over 5,000 acres</td>
<td>C</td>
<td>18</td>
</tr>
<tr>
<td>Total all sizes</td>
<td>C</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>All</td>
<td>130</td>
</tr>
</tbody>
</table>

* Location is indicated by “C” for cheatgrass and “NC” for noncheatgrass areas.
IV. CHEATGRASS IN RELATION TO SOIL EROSION AND FERTILITY

In sections II and III it has been pointed out that cheatgrass, while not the best feed, has sufficient forage value to be welcomed to many of our depleted ranges in spite of its role of chief villain in the black drama of fire loss written on our ranges in recent years. There is one other important chapter in the cheatgrass biography—its effect upon the soil. In the long run the livestock industry can exist only so long as the soils last. Even a slight removal of top soil results in

Figure 27. Drews reservoir watershed in Lake County. When the perennials leave, erosion comes. Such deep gullies as these are less important than the more widespread type of erosion that makes streams muddy. Soil Conservation Service Photograph.
less forage and less livestock, perhaps for all time. The most valuable usable forage from the standpoint of the nation is the one that best conserves the soil. The roots of perennials bind the soil; the roots of annuals are less effective. The top six inches of soil is the important part and usually contains 90 per cent of the total root systems of plants. The subsoil lacks organic matter from decaying roots and is unproductive. About 96 per cent of the available plant foods is in the organic matter and in turn, most of the organic matter is in the top six inches in eastern Oregon range lands.

**Erosion Reduces Range Productivity**

The 6 to 12-inch rainfall over much of the cheatgrass country isn't conducive to the most horrible examples of erosion we have all seen, because in some years there is no run-off. But the very lightness of the rainfall is responsible for soils low in organic matter and therefore easy to erode in cases of quick melting snow or heavy rains. For fear of outraging local pride, we shall omit conspicuous examples but the reader can pick them out from his own observations all over eastern Oregon and the examples are far more frequent in the cheatgrass areas than in bunchgrass.

Such conspicuous examples, however, have a tendency to fix themselves in the mind as isolated cases that divert attention from

![Figure 28. Another type of erosion in a cheatgrass area in northern Morrow County. Such blows follow cheatgrass fires in the low elevation, sandy areas near the Columbia River.](Image)
The soil is crying, “Come and get me,” to wind and water. The less noticeable but vastly more important damage done by erosion over larger areas. It has been the writers’ observation that the poorly protected soils of this area have a tendency to liquefy on the surface during the spring break-up period and run down slope from a few inches to several feet. This movement affects the top quarter or half-inch of soil in most instances but this seemingly minor fraction often contains the bulk of organic matter present in many poorly developed, semidesert soils. While much of this soil never reaches active drainage channels, its annual movement keeps the upper slopes constantly impoverished. There is thus likely to be a constantly enlarging acreage producing almost nothing.

It is not the intention here to make out a case of alarming erosion of this type going on over much of eastern Oregon. In many cases it is little more than normal geologic erosion that has been going on for ages. In nearly all cases it is a slow process. The predominance of open-stand, bunch-type vegetation and the almost total absence of sod-forming grasses allows the soil to flow downhill. In the places where vegetation has been badly depleted, wind erosion is also disastrous, as in the sand country of northern Morrow County.

Cheatgrass Affords Poor Erosion Protection

Since it is an annual, cheatgrass dies as soon as seed is mature in early summer. Its frail structure disintegrates rather quickly both above and below ground. Because of this, cheatgrass, especially if
too closely grazed, offers less protection against erosion than is given by normal stands of native vegetation. Fall germination of the seed seldom produces enough cheatgrass cover or root growth to change this picture. An early fire that destroys the seed crop, or a dry fall that prevents seed germination, or a dry spring that results in only a two- or three-inch growth, or heavy grazing may leave the ground virtually bare.

Ground cover is fully as important in checking erosion as root structure. Land covered by a mat of unused cheat seldom erodes much, but in cases of fires, erosion on cheat areas is often really destructive. In years when cheat growth is scarce and the livestock clear it to the ground, the following winter and spring often see whole hillsides badly gullied. This has been very noticeable over the past 25 years in the Columbia River counties and on south slopes.

Annuals, as a class, are designed and used by nature especially to fill in the bare spaces and to use the extra rain in the good years. A dry year may find Jim Hill mustard or cheatgrass going to seed an
inch high whereas in a wet year or on a badger mound, either may grow three feet tall. They are fickle plants, designed to deal with fickle nature. A year of heavy rains brings a heavier grass cover that checks the erosion that would otherwise come with heavier rains; but when perennials are killed and annuals are brought in by act of man, this natural balance is destroyed and erosion may be severe.

The reverse of the above point also is true; that is, the conditions that check erosion likewise encourage development of perennials. Accordingly, range management and protection practices that would effectively protect cheatgrass ranges against abnormal erosion and consequent fertility loss eventually would lead to displacement of the cheatgrass by more permanent species.

The deep and elaborate root systems of perennials drawing materials from the subsoil give a constant build-up of soil fertility that tends to offset the inevitable surface fertility losses due to normal geologic erosion. The root system of cheatgrass—shallow and simple—gives no comparable build-up. When surface fertility is lost through erosion on a cheatgrass range, most of the fertility contributions made by cheatgrass may be expected to be included in this loss.

Richards and Minnick, of the Eastern Oregon Livestock Experiment Station at Union, made careful measurements of cheatgrass and bunchgrass roots at the end of the growing season. The cheat roots totaled 26 feet per plant, while bunchgrass had 1,722 feet. Crested wheatgrass had even a larger root system. (See Table 2.)

The vulnerability of cheatgrass to fire greatly increases the erosion loss. On grazing districts alone over the 3-year period, 1941-1943, as a result of cheatgrass fires a yearly average of nearly 300,000 acres have called, "Come and get it," to the greedy erosion forces.
Table 2. The Length of Grass Roots*

<table>
<thead>
<tr>
<th></th>
<th>Cheatgrass</th>
<th>Native bunchgrass</th>
<th>Crested wheatgrass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary roots (number)</td>
<td>87</td>
<td>918</td>
<td>836</td>
</tr>
<tr>
<td>Average length primary roots (inches)</td>
<td>2.0</td>
<td>6.96</td>
<td>11.8</td>
</tr>
<tr>
<td>Secondary roots (number)</td>
<td>1,131</td>
<td>38,097</td>
<td>53,755</td>
</tr>
<tr>
<td>Primary root system (feet)</td>
<td>14.5</td>
<td>532.44</td>
<td>822.0</td>
</tr>
<tr>
<td>Secondary root system (feet)</td>
<td>13.8</td>
<td>1,180.2</td>
<td>2,156.4</td>
</tr>
<tr>
<td>Total root system (feet)</td>
<td>26.3</td>
<td>1,722.64</td>
<td>2,978.4</td>
</tr>
</tbody>
</table>

*These figures are from studies made at the Eastern Oregon Livestock Experiment Station at Union, Oregon, in 1940, by D. E. Richards and Kenneth Minnick. Crested wheatgrass plants were about 10 years old. There is no way of knowing the age of the native bunchgrass but size of plant was nearly identical with the crested wheatgrass.

For these reasons it seems that on soils subject to erosion we cannot expect a perpetual cheatgrass-dominated cover to maintain soil fertility at so high a level as would be maintained on the same soil by a perennial-dominated cover. If this is true, the productivity of a cheatgrass range must be expected to decline over a period of years as fertility declines. On steep slopes or under other conditions leading to sharply accelerated erosion, it seems likely that such erosion will not end until the soil is gone. This point has almost been reached in some places, particularly along the canyons near the Columbia River, and on some of our shallow scab lands. Muddy water in the spring serves notice that soil is headed toward the sea.

Cheatgrass is thus not only an indication that the range is degenerating; its presence results in a literal downhill soil movement. It is selling our soils down the river.

Cheat may mean a poor range eventually.

Figure 32. Muddy water in a canyon bordered by cheatgrass ranges in Gilliam County has left behind it some of its treasure as it slackened its force at a wide spot in the canyon.
V. POSSIBLE COURSES OF ACTION

Much of the picture so far is gloomy. If the forage on a range can't be improved and if in the very nature of things it is bound to grow worse, because of soil depletion, we have only impoverishment waiting at the end of the road. The news isn't that bad. The American way is the constructive way, and there are three constructive steps to follow on the three classes of range:

1. Handle noncheatgrass ranges so that the "non" will stay in their name.
2. Reestablish perennials on those ranges that have a good sprinkling of them left.
3. Whenever possible gradually seed the straight cheatgrass to other grasses.

Point 1 has been dealt with in other sections. Point 2 is possible if:
   a. The spring use is delayed long enough to let perennials get started. Early spring use is hard for the perennials to take under any range condition.
   b. Additional early spring feed is provided either in the yard or by developing other pastures, such as rye or crested wheatgrass.
   c. The ranges are grazed alternately, allowing no spring or summer use at all at least once in three years—preferably once in two years.
   d. The stock is spread over all the range and not allowed to concentrate near the water. This involves water development, fencing, salting, and herding practices.
   e. Fires are controlled.
   f. Erosion is checked.

The following series of pictures (Figures 33 to 41) shows the steps necessary to start perennial grasses on the "come back trail."

This program is sound enough on those ranges where enough native species remain to furnish seed sources. It is rather astonishing to find how a revamped use of this sort will bring to light clumps of bunchgrass whose presence was not suspected. The natives, loath to die when their realm is invaded and conquered, maintain a sort of unnoticed underground organization that will spring up when aid arrives.

Reseed—How—When—Where—With What?

On a few ranges there is no way to get perennials except to seed them—the native stock is all gone.
For all range reseeding work, there are two essentials:
1. A high percentage of the existing vegetation must be killed before the seeding is attempted.
2. The seed must be covered.

Figure 33. Delay spring turnout and let the good grasses start to grow. Grass on right has been well handled on this Gilliam County farm. Early and heavy spring use is the worst enemy of perennial grasses.

Figure 34. Provide additional spring feed by seeding rye or crested wheatgrass. Cattle grazing on crested wheatgrass supplemental range in Harney County.
In cases where the land can be plowed, such as abandoned wheat or rye land, the best course is to summerfallow, just as for a grain crop, and seed in the fall with a grain drill. Many thousands of acres of land have been successfully seeded in this way. A few prominent livestock men, such as L. A. McClintock of Pendleton and Lester Friday of Madras, have followed this plan on large acreages.

In cases where plowing is impracticable, fire may be used. In the case of cheatgrass ranges, the fire should be early—before the seed drops to the ground. Late summer fires commonly flash over the land so fast that much of the seed on the ground is undamaged. An early fire burns more slowly and destroys the seed if it is still on the plant. A heavy stand of cheatgrass in a good year will produce about 500 pounds of seed per acre. If 5 pounds, for example, of crested wheatgrass are seeded into this mass of seed, the domestic grass will be overwhelmed by sheer weight of numbers.

To get a good burn in the early summer, it is often necessary to let the forage accumulate for two years. Otherwise, on many desert ranges there is not enough material to carry a fire. After seeding, there should be no use of the range for another full year. This process would require nonuse of a range for three full years. This, together with cost of seeding, makes reseeding an expensive proposition for low-cost, low-yielding range lands. Its main justification is that perennial grasses will save the soil, and the reseeding in critical areas may be less expensive in the long run than perpetual fire guarding and fire fighting.

If the land is of such character that a drill can be used, it is the best implement. A deep furrow drill is far better than the standard disk or hoe drill. The furrows catch snow, hold moisture, and put the seed down into moist earth.

Cover the seed

If a drill cannot be used, brush drags, railroad rails, or other homemade implements are often better than ordinary farm machinery. Anything that will move a little soil is satisfactory.

Airplane distribution of seed is cheap, but unfortunately it requires some other operation. Birds, mice, and squirrels have a field day with seed strewn on top of the ground. If one must go over the surface with a rail after the airplane has spread the seed, it may be just as cheap to figure out another way to spread the seed in front of the rail. Airplane seeding should cost 25¢ per acre or less for seeding large acreages. Covering by railing will probably cost another 25¢. Neither figure includes cost of seed.

An aggregate of close to half a million acres of cheatgrass ranges has been seeded in western states in recent years with all manner of
results, good and bad. Usual costs have varied from $1.50 to $2.50 an acre, depending upon intensity of seed bed preparation, method of seeding, and cost of seed.*

In view of the above cost, the economic workability of a general reseeding program as a private enterprise appears doubtful except on better than average ranges. For example, in an area where native range pastures have a rental value of 35¢ per A(nimal) U(nit) M(onth) of carrying capacity, land producing forage at the rate of 5 acres per AUM would have a capital value of $1.40 per acre if capitalized at 5 per cent interest. Similarly, land producing forage at the rate of 4 acres per AUM would have a capital value of $1.75 per acre; and that furnishing feed at the rate of 6 acres per AUM would be worth, on that basis, $1.15 per acre. It might seem poor business to spend more for seeding the land than it would be worth after the seeding. This argument would apply especially to privately owned land. It is not so applicable to government agencies because of the very low interest rates and because funds spent upon public projects can be amortized far beyond the lifetime of any modern Methuselah. Also, the yearly amortization charge on public lands may be lower than costs for fire fighting and fire prevention.

There are cheatgrass lands in the higher rainfall counties, such as Wallowa, and in creek bottoms or level lands in all counties where carrying capacities are much higher. In all of these favorable sites, reseeding will pay well.

If the cheatgrass is deliberately burned in the early stage to prepare for seeding, it should be done only by a large crew of ex-

* Pickford, G. D., and Jackman, E. R., Reseeding Eastern Oregon Summer Ranges, Oregon Experiment Station Circular 159, 1944.
Crested wheatgrass has the widest adaptation of any of the cultivated grasses. Others that could be used to diversify the forage include:

<table>
<thead>
<tr>
<th>COMMON NAME</th>
<th>BOTANICAL NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beardless wild-rye</td>
<td>Elymus triticoides</td>
</tr>
<tr>
<td>Big bluegrass</td>
<td>Poa ampla</td>
</tr>
<tr>
<td>Blue wild-rye</td>
<td>Elymus glaucus</td>
</tr>
<tr>
<td>Bluebunch wheatgrass</td>
<td>Agropyron spicatum</td>
</tr>
<tr>
<td>Bulbous bluegrass</td>
<td>Poa bulbosa</td>
</tr>
<tr>
<td>Giant wild-rye</td>
<td>Elymus condensatus</td>
</tr>
<tr>
<td>Idaho fescue</td>
<td>Festuca Idahoensis</td>
</tr>
<tr>
<td>Indian ricegrass</td>
<td>Oryzopsis hymenoides</td>
</tr>
<tr>
<td>Intermediate wheatgrass</td>
<td>Agropyron intermedium</td>
</tr>
<tr>
<td>Junegrass</td>
<td>Koeleria cristata</td>
</tr>
<tr>
<td>Little bluegrass</td>
<td>Poa secunda</td>
</tr>
<tr>
<td>Long-headed wheatgrass</td>
<td>Agropyron elongatum</td>
</tr>
<tr>
<td>Needle and thread grass</td>
<td>Stipa comata</td>
</tr>
<tr>
<td>Nevada bluegrass</td>
<td>Poa Nevadensis</td>
</tr>
<tr>
<td>Pubescent wheatgrass</td>
<td>Agropyron trichophorum</td>
</tr>
<tr>
<td>Thickspike wheatgrass</td>
<td>Agropyron dasystachyum</td>
</tr>
<tr>
<td>Western wheatgrass</td>
<td>Agropyron smithii</td>
</tr>
</tbody>
</table>

Some of these grasses are not commercially available, but seed growers could be found if there were a demand for the seed. Most of the grasses were once established on these same ranges. A few are imported, mostly from Asia. Some shrubs, such as bitterbrush (*Purshia tridentata*), might also be seeded, although work to date with reseeding of shrubs has not been very successful. Unfortunately, there is no known legume with forage value that will persist on the desert type ranges. If a large scale seeding operation were to be developed, along with it should go a seed production program by farmers experienced in grass seed growing.

Seeding should *always* be done in the fall. Chances for success are fully ten times as great as with spring seeding. With any of the above grasses, a rate of five pounds per acre is usually enough.

As mentioned before in this bulletin, seeding will be of no avail without changes of grass management to allow the perennial grasses to live. It does no good to go to the expense of seeding perennials only to have them killed by the same processes that killed the original grasses and shrubs. In the long run the management change does not involve reducing numbers, for most ranges with good bunchgrass carry more livestock per section than the cheat ranges. It will involve less livestock during the period of grass establishment.

---

*Pechanec and Stewart, *Sagebrush Burning, Good and Bad*, U. S. Department of Agriculture.*
Thus, whether a try is made for the native grasses or whether new ones are tried, success depends upon some change in management. In either case, a return to the original native forage would require revision of range operations to provide for much lighter spring use.

Early Spring Operations Face Difficult Adjustment

For many early lamb producers such a change would involve either setting lambing dates two to four weeks later than present schedules or providing yard feeds for the lambs for an equivalent period before turning out. The expressed view of early lambers generally has been that their success depends upon making the earliest possible use of the range throughout the spring season, following the lush first growth from lower to higher elevations from turnout to marketing time. Any delay in this schedule generally is considered impracticable.

That other views have been growing in the industry is indicated by the increasingly common practice of creep-feeding early lambs for some weeks before turnout and by the number of individual operators who delay turning out for from a few days to two weeks after the earliest permitted date. As long ago as 1938, one of the largest early lamb operators in the Snake River country stated his conviction that the industry long had been operating on a schedule too early even for its own immediate good, regardless of the effect upon the range, and that sound long-time range management would require a delay in turnout of two to three weeks from the then customary dates.

Cattlemen with cheat ranges have much the same problem, except that it may be easier for a cattlemen to readjust his turnout period than it is for a sheepman. Early use of perennial grass year after year is likely to kill it, whether the use is by cattle or sheep.

On some ranches the early spring use of grass can be side-stepped by using rye fields for supplemental grazing or by planting suitable acreage of crested wheatgrass on land formerly dry-farmed. Either plant furnishes far more feed per acre in the early spring than does the cheatgrass. On other ranches, irrigated grass meadows might be converted into early feed. If such meadows are given a shot of “high life” in the form of 100 pounds of nitrogen bearing fertilizer per acre, they can often be used two or three weeks before the normal time, provided irrigation is controlled.

More Dual Use Indicated

For many operators the change might call for adoption of “combined operations,” using both sheep and cattle, thereby using the
range to better advantage without hurting it. This would be nothing new in the industry because many successful operators have been doing this for many years. Incidentally, most of them today have a much better balance among the various types of feed on their ranges than exists on most ranges used by only one class of stock.

For the range administrator the change might call for abandonment of certain livestock class segregations in order to gain better balanced use of all areas. For either the user or the administrator the change would merely conform to the fact that nature seldom produces range suited for only one class of stock. If either sheep or cattle are used alone, that range is likely to lose the plants most palatable to that kind of stock. Some of the public lands would benefit by alternating sheep and cattle in different years. This is not practicable in every case because of location of home ranches.

Early Selling of Beef Might Help Some

Since the cheatgrass ranges mature early and cattle may begin to lose weight early in the summer, some operators on these ranges could probably balance their feed supply better by selling earlier. The cheat makes plenty of feed early, but its value falls so fast after maturity and from then on it has such a low carrying capacity that early selling would result in higher weights and the cows and other remaining cattle would presumably benefit from the decreased competition. At least there would be fewer cattle with sore mouths.
Figure 37. Fence, salt, develop water, and herd in such a way that the stock will use all of the range and not congregate on south slopes or near water. This Morrow County range has been cross-fenced to aid in management. *Soil Conservation Service Photograph.*

Figure 38. Control fires. This involves a *complete* fire control program, not just one thing. This Umatilla fire stopped only when it came to a road.
VI. SUMMARY

1. Cheatgrass came to Oregon about 50 years ago, but has done most of its spreading in the past 30 years. It is now in command on about 10 million acres. It is worse on low elevation, south slopes, near water, and where the range has early spring use.

2. It is an annual; must come up in the fall to make much feed; has sharp seeds that cause damage to livestock; is a heavy seeder; often is badly smutted; does not drive out bunchgrass but comes in when the perennial grasses are weakened or killed; and is the worst fire hazard on the range.

3. The yield varies enormously from year to year, depending largely upon the earliness of fall rains and the earliness of spring. Being an annual, it cannot accumulate reserves in the roots to last through a poor year. It is very poor forage while the sharp seeds are still on the plant, but is usually very good for early spring use.

4. It makes palatable spring feed; and the winter grass, after the seeds have fallen, is likely to be more palatable than the bunchgrasses. Stock lose weight on it earlier than on bunchgrasses.

5. Stock cannot maintain weight on dry cheatgrass alone.

6. Cheatgrass in alfalfa fields is one of the troublesome features. It can be kept out by seeding good grasses with the alfalfa.

7. Cheatgrass helps to kill sage by carrying fires.

Figure 39. Check erosion that can ruin a range. This is a picture of erosion in Lake County.
8. The same things that killed the bunchgrasses, if persisting, will kill the cheatgrass and bring in more objectionable grasses and weeds.

9. Cheatgrass ranges cannot be improved much except by replacing the cheatgrass with better forage.

10. Most of the range fires in Oregon are cheatgrass fires. A cheat range is 500 times more likely to burn than a noncheat range.

11. Cheatgrass fires are costly in time, equipment, feed, fences, buildings, livestock, and loss of land by resulting erosion.

12. Fireguards are helpful temporarily. Most of the fire loss is from large fires and suitable firebreaks would prevent these large losses. Reseeding is the only permanent solution.

13. Cheatgrass leads to erosion and thus a constant lessening of the productivity of a range. A cheatgrass range is thus likely to produce less and less and in the end may not even support cheatgrass.

14. Reseeding is costly as a private enterprise, but is more feasible on public lands because of the saving in fire fighting costs.

15. Reseeding after a fire is the most feasible system, but the seed must be covered. A fire, to be effective for this purpose, must be early in the season while the seeds are still on the plant.

Figure 40. Sagebrush on right, crested wheatgrass on left. After six years there has been very little encroachment of either plant into the other's domain.
Seeding should be in the fall, at a rate of 5 pounds per acre.

17. To save existing perennials, to reestablish them when some are still present, or to reseed will all require revamped use of the range, especially during the early spring. This may entail longer dry feeding, development of other pastures, use of irrigated meadows, later lambing, or alternate use of range by different classes of stock.

18. Early selling of cattle from some ranges would help.

Figure 42. Two-year-old stand crested wheatgrass on light stand of cheat that was drilled in fourteen-inch rows without soil preparation in Jefferson County.
Figures 43 and 44. These two pictures were taken from the same position (43 in March, 1940; and 44 in September, 1942). Note how a thin stand of crested wheatgrass has thickened by allowing grass to seed, then grazing in the fall, allowing the stock to trample the seed into the ground. Taken in Jefferson County. *Soil Conservation Service Photograph.*