Keynote Address.

Crested Wheatgrass:

Its Values, Problems and Myths

Lee A. Sharp

INTRODUCTION

It is appropriate that a conference commemorating the importance to range management of the grass known as crested wheatgrass be held at this time. Crested wheatgrass was first introduced some 85 years ago and has been of special significance and importance in range revegetation for the past 50 years. The "golden grass of the west", its values, problems and myths is a subject in which I have had a great deal of interest for over 30 years.

BACKGROUND

I would like to spend some time in presenting background material of interest, at least to me, in the evolution of crested wheatgrass to the status of one of the most important forage grasses in the west.

There existed an idea or attitude around the turn of the century that rangeland was of little importance and that it would, except for the parks and forest reserves, pass to private ownership to be used for cropland agriculture. To speed this process along Congress legislated the Carey Act in 1894, the Newlands Act in 1902 and the Enlarged Homestead Act in 1909. The growing of wheat and other cereal crops became a major agricultural activity in the West from 1905 on. No need for a dryland forage crop, such as crested wheatgrass, was apparent.

Although there was no perceived need for a dryland forage grass, federal and state experiment stations in the West were planting, testing and propagating crested wheatgrass. Were these investigators prophets of the future or only hopeful that their work would someday be useful?

In 1897-1898 Professor N. E. Hansen was sent to Russia as a special agent for the Division of Botany in the U. S. Department of Agriculture. He was charged to secure seeds and plants valuable for a variety of purposes. He "succeeded in collecting 57 varieties of vegetable seed, 289 of melon, 75 of fruit and berry plants, 150 ornamental plants, 70 wheat, 14 barley, 20 oats, 6 rye, 70 forage plants, 5 oil-producing plants, and a large number of miscellaneous seeds of desert plants" (Wilson 1899). Among the 70 forage plants were seeds of crested wheatgrass[1], four accessions identified as A. desertorum and one as A. cristatum (Dillman 1946).

One can only speculate, but it is probably significant for the western range states that it was Professor Hansen from South Dakota that was sent to Russia rather than a botanist from New York, Alabama or some other eastern state. The western experience undoubtedly gave him an eye for forage grasses adapted to western conditions.

Again in the year 1898, a stirring of concern about rangeland resources was developing. H. L. Bentley (1898), of the U.S. Department of Agriculture, expressed alarm over range injury resulting from over grazing in central Texas. Jared Smith (1899), of the Division of Agrostology, reported on grazing problems in the Southwest and how to meet them. The special Public Lands Commission, appointed by Theodore Roosevelt in October, 1903, reported that 1400 stockmen in 16 states had indicated that, "under present conditions, the greater portion of the public grazing lands is not supporting the number of stock they did formerly" (Potter 1905). Present conditions presumably referred to lack of control and regulation of the rangeland, or the opportunity to homestead, lease or purchase sufficient grazing land to make viable ranching units. In 1898 were the beginnings of the development of scientific range management.

At the turn of the century Griffiths in Arizona (1901), Bentley in Texas (1902), and Cotton in

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[1]Crested wheatgrass refers to both Agropyron desertorum [(Fisch. ex Link) Schult.] and A. cristatum [(L.) Gaertn.] in this paper.

Washington State (1908) tried artificial seeding as a means of restoring productivity to deteriorated rangelands. Shortly after transfer of the forest reserves from the Department of the Interior to the Department of Agriculture in 1905, the newly created Forest Service initiated seeding trials at a number of locations (Sampson 1913). The success of these seeding trials varied and no pronounced movement to artifically seed rangelands developed. One needs to realize that at the turn of the century, knowledge about how and when to seed was limited, and the equipment for seeding was largely horse drawn. In addition, a scarcity of seed adapted to various rangeland conditions discouraged those that would improve rangelands by artificial seeding techniques.

As one looks at the list of species used in the various seeding trials and experiments, crested wheatgrass does not appear. This is not surprising because seed distributed from the 1898 introduction did not lead to an increase of available seed. Imagine what the agronomists at the experiment stations in Alabama, Indiana and Michigan thought when crested wheatgrass was planted in the kind of environment that exists at those locations. Some seed was sent to Washington and Colorado but there is no record of any seed increase from either location (Dillman 1946).

At about this time (1906), a second introduction of crested wheatgrass from the same area as the first was distributed to various experiment stations. Dillman (1946) indicates that the seed distributed to the Belle Fourche and Mandan experiment stations provided for the distribution and establishment of crested wheatgrass in the northern Great Plains between 1907 and the early 1920's. The first World War increased the conversion of rangeland to wheatland, and the time for crested wheatgrass had not yet arrived.

The depression, drought and dust storms of the 1930's brought home to the nation that renewable natural resources were not inexhaustable. Excessive production of agricultural goods contributed to the economic depression of the 1930's. Advancing technology, along with an increase in the area devoted to crops, increased production and, consequently, depressed farm prices. A severe drought during this period along with depressed farm prices caused a massive abandonment of farm land in the plains and western states. Dust storms were a common occurrence and the fruits of an unwise land policy became evident. The decade of the 30's became a period of transition from a land policy stressing settlement to one conserving the land for the general welfare of society.

Congress and the administration undertook a number of actions to implement the change in land use philosophy that had emerged. Following the national land use conference in Chicago, the Secretary of Agriculture appointed a National Land Use Planning Committee (Gray 1935). An inventory of the nation's land resources was undertaken so that recommendations for correction of the many maladjustments arising from an unwise land use policy and practices could be made (Wooten 1965). The 1930's was the period in which the Civilian Conservation Corps (CCC) was created, the Taylor Grazing Act provided for regulation of the unreserved and unappropriated public domain, the Soil Conservation Act created the Soil Conservation Service, and a massive federal land-purchase program was initiated.

The importance of crested wheatgrass began to be realized when the federally purchased lands (about 7.5 million acres) were put under management. There was a need on these lands to stop soil erosion, restore vegetal cover on abandoned cropland, and provide an example of the benefits that accrue from suitable land use practices. Because much of the potential rangeland was arid or semiarid and existed over a wide range of soil types, a plant species adapted to such conditions was needed to revegetate cropland and deteriorated ranges.

The time had arrived for crested wheatgrass. There probably never has been a grass so right for the time and the conditions that existed in 1933 when the first funds for submarginal land purchases were allotted. It is fortunate that crested wheatgrass was introduced at an earlier period and that some experiment stations were interested in producing seed and testing the species as a forage plant. By the time the drought and depression years of the 1930's had arrived, crested wheatgrass seed was readily available. The seeding of the farmland purchased by the federal government under the Land Utilization program, first by the Agricultural Adjustment Administration and then by the Soil Conservation Service, established the value of crested wheatgrass for range rehabilitation. After 35 years of incubation, crested wheatgrass fulfilled a role of tremendous importance in the western range states. By June 30, 1938, over 100 thousand acres had been seeded (Wooten 1965), mostly to crested wheatgrass, on the Land Utilization project areas and more was to be seeded. Was it fate or manifest destiny that put crested wheatgrass in the right place at the right time?

The second World War slowed the range rehabilitation program that had started in the 1930's. Following the war, range improvement activities quickened. C. L. Forsling (1945), Director of the Grazing Service, commented that, "The forage cover, and hence the grazing capacity can be improved within justifiable economic limits on literally millions of acres of the federal range by mechanical treatment and reseeding." Pearse, Plummer and Savage (1948) estimated that 80 million acres of rangeland had been so badly depleted that artificial seeding would be required if these lands were to be restored in a generation.

Economic and social conditions following the war were more favorable for investment in improvement of natural resources than at any time in our history. Again, it is fortunate that there was a dryland forage grass species available that could be used to improve semiarid rangelands while economic conditions and the mood of the country were favorable. During the 1950's and early 1960's, seeding of crested wheatgrass on deteriorated ranges occurred at an accelerating rate. In Idaho, for example, the federal agencies seeded 36 thousand acres and individual land owners three thousand acres in 1951 to crested wheatgrass. Ten years later in 1961, the federal agencies were seeding 115 thousand acres and individual land owners 55 thousand acres (Sharp 1965). At the present time, in the neighborhood of 2 million acres have been seeded in Idaho. It has been estimated that 12.5

million acres in western North America have been seeded to crested wheatgrass (Gomm 1981).

I have attempted to provide some background on the use of crested wheatgrass as I know it. There is probably more known about crested wheatgrass than any other single western range forage species. Since its second introduction in 1906, information has accumulated on the ecological and physiological characteristics, management strategies, forage production, seed production, seeding methods, nutritive value, wildlife relationships, and economic importance of this plant. Much of this will be covered in the papers that will be presented during this conference. I would now like to comment, briefly and in a general way, on some of the values, problems and myths associated with crested wheatgrass.

VALUES

One cannot underestimate the values of crested wheatgrass to the soil stabilizing and conserving programs of the 1930's. It provided plant cover on abandoned and eroding farm land. It also provided cover for deteriorated rangeland as well as producing tons of forage for grazing animals.

Because crested wheatgrass evolved in an environment where heavy grazing has occurred for centuries, it is well adapted to early and close defoliation. This is not true of most of the native cool season grasses of the West. This characteristic was of special importance in areas where grazing animals had to be removed early in the year from the hay producing lands of the ranch enterprise. Feeding hay is normally more expensive than grazing animals on rangeland. Having range forage available at an earlier date reduced the costs of operation and made ranch enterprises more economically viable.

Good seed production, ease of seed harvesting, high germination rate of the seeds, remarkable establishment rates, drought tolerance and a wide amplitude of adaptability to semi-arid ranges adds greatly to the value of crested wheatgrass. The nutritive value of the plant in the spring of the year has been likened to that of a watered concentrate (Watkins and Kearns 1956). Yearling animal gains of 2.5 pounds a day are not uncommon in the springtime (Sharp 1970).

A value not commonly recognized, and difficult to document, relates to the improvement of adjacent native range. This occurs because the crested wheatgrass seedings often reduce grazing pressure on native range areas, or provide for management programs that are more suitable for improvement of native ranges. The fact that crested wheatgrass is forgiving of management mistakes, provided that they are not continually repeated, also adds to its value in range rehabilitation and management programs.

During the 1940's halogeton (Halogeton glomeratus) became a major problem on extensive areas of rangeland in the Intermountain region. Because halogeton is an annual plant and not a good competitor with perennial plants, crested wheatgrass seedings minimized the losses due to halogeton. Crested wheatgrass seedings also reduced the area occupied by host plants of the beet leaf hopper (annual mustards), thus reducing costs of operation to sugar beet growers.

Observations indicate that some species of wildlife benefit directly from crested wheatgrass seedings while others may be adversely affected. Through relieving pressure on other range areas, however, wildlife commonly benefit.

In an area where I have worked for many years, crested wheatgrass seedings have prevented many livestock operators from going out of business. Tax revenue and fee receipts for livestock grazing have been increased over what they would otherwise have been.

Undoubtedly there are additional direct and indirect values associated with crested wheatgrass. Some of these will probably be indicated in the papers that are presented at this conference.

PROBLEMS

Early in the development of the crested wheatgrass seeding program, fear was expressed that range managers would look to artificial seeding of rangeland as an alternative to the application of sound management principles. In my view, this anticipated problem did not materialize. In fact, we find that crested wheatgrass seedings increased the options and flexibility for management of the unseeded rangelands.

Management problems have developed in places where crested wheatgrass has been seeded on areas with adjacent or intermingled native range plants. This is due to the selectivity of animals and the competitive ability of crested wheatgrass. Other plants would often be severely grazed before crested wheatgrass was used to any extent, giving the grass a competitive advantage. Grazing at insufficient levels of utilization causes "wolf" plants to develop in some crested wheatgrass seedings. These plants remain ungrazed year after year while grazed plants may receive excessive defoliation. As a consequence, there is a reduction in carrying capacity and an unpleasing appearance to the stand of grass.

In some areas, where calcium/magnesium imbalances exist, grazing animals may develop grass tetany on crested wheatgrass forage in the spring. This has been particularly troublesome on the loess soils of the Snake River Plains.

Large seedings with rectangular shapes offend the aesthetic sensibilities of some individuals. Others see problems because of a perceived instability of crested wheatgrass "monocultures". The infestation of some stands with the black grass bug (Labops spp.) tends to support this concern.

At the present time, the lack of suitable forbs and shrubs that could be seeded with crested wheatgrass over its range of adaptability is a concern of multiple use managers. Attempts are underway to resolve this problem and suitable plants may soon be available (Shaw and Monsen 1983). Reinvasion of stands of crested wheatgrass by species of sagebrush creates problems in some areas.

Some of the problems associated with crested wheatgrass are more imaginary than real. Individual differences in the perceptions of the nature of rangeland, and how and for what purpose it should be used create some problems.

MYTHS

With the knowledge available at the present time, only a few myths persist. Crested wheatgrass was considered to be unpalatable to grazing animals a number of years ago. It is difficult to understand how this myth arose, but one can speculate that seeded stands may have been deferred too long before grazing was permitted. Once the "wolfy" character develops, the palatability of the plant drops dramatically.

The epithet "biological desert" surfaces periodically. This myth appears to be fostered by those who object to livestock grazing on the public lands. As dense sagebrush or annual plant communities are changed to perennial grass communities, the habitat conditions for animal and other plant species also change. The number and kinds of species, plant and animal, that exist in the new habitat may be fewer or more than before modification. When the term "biological desert" is heard, one needs to ask "compared to what"?

CONCLUSIONS

Over the years there have been a number of conferences and symposia focusing on crested wheatgrass. None have been so wide ranging or comprehensive in coverage as this one. A great deal has been learned about crested wheatgrass over the years through research and practical experience. As one looks through the list of speakers and those in the audience, the realization comes that many many years of research and practical experience with crested wheatgrass are represented here. We all stand to gain tremendously in understanding and knowledge from the participants and attendees at this conference. I am very appreciative to have been asked to attend and address this distinguished group.

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