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Bulletin No. 31 - The Worst Weeds of Wyoming and Suggested Weed Legislation

University of Wyoming Agricultural Experiment Station

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UNIVERSITY OF WYOMING.
Agricultural College Department.

WYOMING EXPERIMENT STATION,
LARAMIE, WYOMING.

BULLETIN NO. 31.
DECEMBER, 1896.

The Worst Weeds of Wyoming

... AND ...

Suggested Weed Legislation.

BY THE BOTANIST.

Bulletins will be sent free upon request. Address: Director Experiment Station, Laramie, Wyo.
Wyoming Agricultural Experiment Station.

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To the Citizens of Wyoming.

The Experiment Station exists in order that it may be of service to the people of this State in particular, and to the agricultural interests of all in a general way. To this end it is due the Station that it have the hearty co-operation of all whom it is intended to serve. Its highest usefulness will be attained so soon as the efforts of the station workers can be concentrated upon the problems which press most urgently for solution. This cannot be accomplished unless the constituency of the station will place themselves as individuals in communication with the workers of the station, from whom they would like help. Let the problems which confront you be freely communicated, and the station will help you solve them, devoting special time to it if it be a problem of general interest.

The botanist invites correspondence on all topics of economic interest concerning plants, such as the prevalence of important weeds, the best means of destroying them, the appearance in any locality of new ones, any unusual development of old ones, the diseases of any of the cultivated crops due to Fungi, or any questions of that character.

He will determine any plants sent for that purpose. Material sent for identification should be as complete as possible. If the plant be small, send the entire plant or several of them. These should, where possible, have leaves, flowers and fruit. Of larger plants send a part containing average leaves with flowers and fruit, if it can be had. Portions of diseased crop plants may also be sent for determination of the Fungus causing the disease. All such material can be sent fresh by mail if closely wrapped in newspapers, or can first be dried under pressure between thick pads of newspaper and then sent by mail between pieces of paper securely protected by heavy pieces of cardboard.

All packages should be marked with sender's name and address, and be accompanied with a letter of explanation.

All communications of a botanical nature should be addressed to

THE BOTANIST,
Experiment Station,
Laramie, Wyoming.
The Worst Weeds of Wyoming.

AVEN NELSON.

THE NATURE OF WEEDS.

As indicated in the title of this bulletin, it is not the intention of the writer to attempt at this time an exhaustive treatment of the subject of weeds. Its very nature is such as to preclude the hope of saying the final word on this subject. That this must be so is readily understood if we will call to mind what weeds are, and that the term weed is largely a relative one. The weediness of a plant depends in many cases upon the observer's point of view; that is, a plant is pronounced a weed, bad in proportion to the hindrance it offers to the production of that which is at that particular time and place the desirable, or good.

It has often been said that a weed is only a plant out of place, which may be accepted if we will add that it is one that insists on growing where it is not wanted.

It may be well to remember that there were no weeds anywhere till man appeared and found that certain plants could serve for him certain economic purposes. At first such plants as were from time to time found of use, were simply sought out from those places where they had succeeded in maintaining themselves in spite of the severe competition to which all plants in a state of nature are subjected. As these plants or their products became more and more desirable it dawned upon first one and
then another to assist these desirable plants in their struggle for existence. This it was found could be done in two ways; by keeping down the other plants with which these were competing, or by removing the desirable ones into new localities where competition would be less severe.

When this point had been reached in man's struggle with nature, agriculture had its inception, and from that day to this some plants have been favored and others repressed by the hand of man.

On each of these two classes of plants this kind of treatment has produced its legitimate result. The undesirable class has grown more aggressive, holding its ground more stubbornly in each succeeding generation, developing but one quality, namely, that of maintaining and propagating itself under the most adverse circumstances. The desirable class, as it was more and more relieved from the necessity of striving for space, for food and for sunshine, developed its useful qualities to a greater degree, but on the other hand it became less and less fitted to struggle single handed, as it were, with its natural enemies.*

This dependence upon man has been and is still constantly being intensified by man's selective agency. For purposes of propagation those plants are selected which have shown a tendency to produce the desirable product in greater abundance or of more perfect quality, hence it has come about that nearly all plants of economic importance are man's wards, dependent upon him for their

*The oft used phrase, "Struggle for existence," given to us by Darwin, is used as he used it, in a large, metaphorical sense. Not even in the animal world is this struggle often an active combat, but it is none the less real and relentless. If one secures in a legitimate way, by reason of superior endowments, what a thousand need in order to maintain existence but only one can have, the struggle is just as actual, though it is an unconscious one, and the results to those that fail just as inglorious.
very existence, but rewarding him for his care by a superabundance of food materials, superior fibres for his various fabrics, and for his aesthetic sense a wealth of beauty surpassing an artist's dream.

These, then, are the two classes of plants with which the tiller of the soil has to deal, one class representing all those that are at present known to be valuable to man; the other those which to a greater or less extent interfere with the most successful production of the first. To these last in a general way the term weeds is applied, but in its more restricted sense the term is applied to the larger or seed producing plants which come into direct competition with our cultivated plants by occupying or attempting to occupy our orchards, our gardens and our fields. Also, as previously suggested, the term has a significance relatively considered. The same plant may at different times be both a weed and a valuable plant. A volunteer crop of buckwheat in a cornfield is no less a weed than a thistle in a hayfield, hence plants cannot all be arbitrarily separated into good and bad, as the classification of some will depend upon the cultivator's point of view. For our present purposes, then, a weed may be defined as any plant which, by taking possession of the soil, reduces the quantity or quality of the desired crop, or becomes in any way an offense to the eye or an obstruction upon the lands in question.

**THE EVOLUTION OF WEEDS.**

Thousands of kinds of plants are found growing in greater or less abundance upon the earth. These all strive to perpetuate themselves, some in one way, some in another, but most of them produce seeds or spores which are intended to secure the continuity of the plant's life in
that of new individuals successively produced. It can easily be shown that even the forms which produce the smallest number of seeds per plant, produce enough to cover the whole earth in a few years if each seed were allowed to germinate and develop. What, then, must be the condition when the thousands of kinds of plants, some of which literally produce tens of thousands of seeds, are striving to perpetuate themselves! How fierce must be the competition for place and food! As a result of this struggle for existence, some have adapted themselves to one condition and mode of life and some to another. In the life histories of the races which each represents we see intensified all those variations which have favored them in this fierce combat, not only with other forms, but even with those of their own kind. Those forms which have been able to adapt themselves to the most diverse conditions, to develop the most successful expedients for reproducing their kind and to most surely withstand adverse environments, are the plants which are now our worst weeds. These characteristics as displayed in the weeds of the following list will be considered in connection with each.

THE NOXIOUSNESS OF WEEDS.

All who have had any experience with weeds know only too well that some weeds are always an unmitigated nuisance and most of them a constant source of annoyance and financial loss. Few, however, realize to what extent the failure or partial failure to obtain remunerative results in their agricultural ventures is due to the weeds that run rampant in their fields and fence corners. The losses are always occasioned in several ways, among which may be mentioned the following: The weeds crowd out
The Worst Weeds of Wyoming.

or shade out the less vigorous plants of the crop, thus reducing the number from which returns may be expected; they abstract from the soil such large quantities of plant food that the crop plants that do survive are not able to attain full development, and so yield inferior products that are unsalable or at best bring but small returns; they interfere with the most expeditious and economic methods of harvesting, and the harvested products, because of admixture with weeds or their seeds, sink still lower in market value; they may cause serious injury to stock, as in the case of Squirrel-tail Grass and some thistles; they may cause serious injury to such animal products as wool by reason of their hooked seeds clinging to and becoming involved in it as do all sorts of burs; the farm itself becomes less and less valuable, and the difficulty of disposing of it greater, for the intending purchaser sees the evidences of an impoverished soil well seeded to weeds. The fences to some extent concealed in the weeds on either side do not create a desire in any one to possess the enclosed acres. That sometimes some use can be made of some weeds does not prove that weeds are a good thing; it may be worth while to save a crop of Rag-weeds in times of scarcity, but it were better to grow something else.

THE PERMANENCY OF WEEDS.

Weeds, like the poor, we have always with us, and again like the poor, they are the most numerous in the most shiftless communities. As shiftlessness causes poverty and poverty induces shiftlessness, so shiftlessness endures weeds and weeds cause poverty now just as they did in the time Solomon. It is possible now as then to go by the field of the slothful and see it all overgrown with thorns and thistles, with the usual accompaniment of the
broken down wall,—all evidences of a little more sleep and a little more folding of the hands. Now, as then, poverty comes to such a place as one that travelleth, and want as an armed man; but do we, as Solomon, look upon it and receive instruction?

**CLASSES OF WEEDS.**

With reference to their natural period of life, weeds are spoken of as (1) Annuals, (2) Biennials and (3) Perennials.

The first are reproduced from seed each year, and are easily destroyed, as a rule, by uprooting, and will be eradicated if all the plants springing from a given crop of seed are destroyed. It is well to remember, however, that all the seeds do not germinate the first season. In many cases it is in the nature of the seeds for a part to grow the first and the rest the second year or even later. If the conditions are unfavorable, as lack of moisture or being buried too deeply, they may lie dormant for several years and then spring up, much to the wonder of the farmer as to their origin.

The second live two years, storing up food in the tissues during the first season in order that seed in superabundance may be rapidly produced during the second. These yield to the same methods of extermination as the first.

The third, living for a number of years, are, as a class, the most troublesome. Such perennials as are classed as weeds do not depend upon seeds alone for their propagation. They are provided with underground stems, known according to their structure and form, as rootstocks, bulbs, corms or tubers. These have the power of giving rise to new plants; and separation from the parent plant,
or even dismemberment of these underground stems, only serves to facilitate the production of new individuals. To this class belong those which most stubbornly resist eradication, as for example the Canada Thistle and Quack or Couch Grass. Many of our worst weeds, however, belong to the other classes, not because the individual plants are hard to kill, but either because of the vast number of seeds produced or the remarkable contrivances for securing their wide dispersal.

For convenience weeds may again be divided into two classes, viz: 1, Cosmopolitan, and 2, Local. In the first class we will place those which, on account of some remarkable power of propagation or some extraordinary vitality, are at home anywhere and are therefore peculiarly difficult to eradicate. These often require concerted action on the part of communities or states to secure their extirpation and thus avert the loss and annoyance which their complete establishment would entail. In this class we find our worst weeds, but it is to be remembered that such a term can be only a relative one. The worst weeds of one community are not necessarily those of another, for differences in soil, in climate and in character of crops will determine which are most to be feared. In the second class are all other weeds which yield to the ordinary means, viz: cultivation of the ground; in fact, they are rarely found outside of cultivated ground, and if so found are of no particular detriment. This class may very properly be left to individual concern, for the thrifty husbandman will see to it that his crops do not suffer on account of them, and the careless will have to be left to his own folly so long as he does not by his neglect inflict injury upon others.
PURPOSE OF THE BULLETIN.

I do not cherish the Utopian dream that we shall ever be rid of weeds, but there are some kinds that ought to receive the most earnest attention, not only on the part of individuals immediately concerned, but by the State as a whole. It is the purpose of this bulletin to call attention to such, to assist in making them known, to point out the dangers to be feared from each, to help in solving the difficult problems connected with their eradication, and to suggest some needed legislation looking to this end.

In order to secure community of action in this matter it is necessary that the worst pests shall be known and recognized by all. To this end a few of those which, in the judgment of the writer, are at present most to be feared are illustrated and briefly described. As the only object in view is ready recognition of the plant, non-technical language is used, reliance being placed upon the illustrations for enforcing the descriptions. It would be an easy matter to run up a list of a hundred or more weedy plants, but it seems wiser to direct attention to a few very aggressive ones that are weeds first, last, and all the time.

RUSSIAN THISTLE,

(Salsola Kali Tragus (L.) Moq.)

As it is intended to consider the weeds of this list in the order of the danger they present to our agricultural interests, the Russian Thistle is placed first, for the danger it threatens is both real and imminent. It has already inflicted untold injury upon the farmers of some of our neighboring States, viz.: Nebraska, Iowa, Minnesota and the Dakotas. Several other States are suffering more or
less, but having grappled sooner with the problems of its repression, much has been done in some of them to prevent its securing a foothold. In all of them active measures have been taken, which are doing much to restrict it, even in the worst infected States.

Wyoming cannot afford to delay in this matter; the pest is well established within our borders, and will, in another season or two, be entirely beyond our control. Our climatic and soil conditions are just such as to make this the ideal home of this dangerous tumbleweed.

**HISTORY OF THE PLANT.***

The plant seems to be native on the plains of southeastern Russia, where it has long been a troublesome weed. It found its way into the United States in 1873 or '74, having been brought to South Dakota in flaxseed imported from Russia. The land where it was introduced being somewhat broken, and corn the principal crop, it did not at first spread very rapidly. It was not till about 1888 that it had thoroughly established itself in South Dakota, but about this time it spread beyond her borders and invaded North Dakota on one side and Iowa on the other.

From this time on its dispersal has been rapid beyond all precedent. History records no instance of so much territory invaded by any plant in so short a time, for in these few years it has appeared in nearly all the States from California to New York, and from Canada on the north to Kansas and Colorado on the south.

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*Mr. L. H. Dewey, Assistant Botanist of the Department of Agriculture, has studied the Russian Thistle in all of its aspects very carefully. The results of his investigations have been published in Farmers' Bulletin No. 10, 1863; and a much fuller report in Bulletin No. 15 of the Division of Botany. These publications are the sources from which much of the information concerning this weed has been drawn for the now rather extensive literature upon the subject. Several of our Experiment Stations have, however, added greatly to our knowledge of it. All of these sources have been freely drawn upon by the writer, who hereby gratefully acknowledges his indebtedness.*
Two causes have contributed to this unapproachable record, viz: first, its peculiar facility in distributing its seeds, naturally on its own account, artificially, by man’s aid, in hay, in grain, and in seeds generally; second, suitable soil and favorable climatic conditions. It is just one more instance of the fact that some plants and animals, when transferred to a new locality, find more favorable environments than in their native home. Most of our truly troublesome weeds are of European origin.

**ITS HISTORY IN WYOMING.**

Though reported from a few points in the State in 1893, it is probable that all such reports were due to persons mistaking other more or less similar plants for the one in question. At least this was so in the cases verified.

Not till the fall of 1894 was an authentic specimen communicated to this Station. This was received from Mr. F. J. Stanton, of Cheyenne, who wrote that it was fairly well established at some points near the railroad. A press bulletin was at once issued sounding a note of warning, which received large publicity through the papers of the State. To this in part may be due the apparent freedom from the weed except along railroad lines, for this placed every suspected weed under the ban.

In 1895 specimens were received from Douglas and Frederics, and this season, 1896, the writer has observed it in a large number of places, in fact at every railroad point visited in a somewhat extended botanical collecting trip.

On the line of the Union Pacific it was plentiful both at Laramie and Cheyenne, at the latter place in all waste ground, sometimes almost to the exclusion of other weeds. On the Cheyenne and Northern, specimens were not rare
at Wheatland, Uva, Badger and Orin Junction. The crop on the Elkhorn at Lusk, and on the Burlington at Newcastle, Moorcroft, Sheridan, Ranchester and Parkman was even more prolific. As these, the only points at which personal investigation was made, were all infected, it seems justifiable to suppose that the weed is found at most points upon all of these lines.

Prof. W. C. Knight, of this Station, reports it abundant at Casper and at various points upon the freight road between that point and Lander, viz: on Poison Spider Creek. At these points it has probably been introduced by seeds in the grain which the freighters have fed at the camping places along the trail.

METHODS OF DISPERSAL.

The Russian Thistle belongs to the class of weeds properly called *Tumbleweeds*. It is not a thistle at all, and has been so called only on account of its spines. It would have been more in keeping to have called it the *Russian Tumbleweed*.

Tumble weeds are plants which usually branch freely, assuming in the course of growth a somewhat spherical form. These plants are annuals, and when mature and dead the one comparatively slender root is easily snapped by the wind and the plant is set adrift, to be threshed over miles of prairie and plain by every storm. On treeless and fenceless areas they travel till worn out, and, as their seeds are not readily dislodged, the thousands* that each plant bears may be distributed over scores of miles. This, while true of all tumble weeds, is especially true of the Russian Thistle.

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*A plant of average size, weighing when dry 3 or 4 pounds, it is estimated bears upwards of 30,000 seeds; while the largest, sometimes weighing 20 pounds when dry, bears 150,-000 to 200,000 seeds.*
But were this the only manner in which its seeds are scattered it would not be so bad, for there are some natural barriers which it would hardly cross. Hay and grain and seeds in general are sent from infected areas, bearing, perhaps, the one seed which serves to infect a new region. Stock cars in their hay and litter carry the seeds from State to State, as evidenced by the fact that almost invariably the points of first appearance are on railroad lines, particularly about stock yards and other places where cars are cleaned from time to time.

SPECIAL DANGER IN WYOMING.

The belief that Wyoming has more to fear from this weed than most of the other States is based upon the following facts: The Russian Thistle belongs to a family of plants, the Chenopodiaceae, of which we have many native representatives. In common with many of these it thrives in all soils, but seems even to be favored by a percentage of alkali. Drought is no hindrance to it; it matures a crop when all else fails.

Our large areas of unoccupied lands, treeless and unfenced, offer unobstructed and immediate dispersal.

While it is true that it is not able to establish itself in well sodded ground, it is equally true that the open and imperfect sod of many of our native grasses do not resist its encroachments. At several points along the railroads it was observed among Blue Stem and other grasses. Once established on the general range, where it is everybody's or nobody's business to destroy it, it will never be exterminated. Viewed from this standpoint then it cannot be attacked too soon while it is yet, chiefly at least, upon railroad lines and in and about our towns and villages.
PLATE II.—RUSSIAN THISTLE. Detail figures. For references see description in text. (From Bulletin 15, U. S. Dept. of Agriculture.)
DESCRIPTION.

Technical description is purposely omitted, for I take it that those who are particularly interested wish simply the easiest method of recognizing it. To this end I give the following excellent popular description by Mr. L. H. Dewey, as given in the bulletins to which I have previously referred. The detail figures in Plate II, from the same source, and plates* I and III, will enable any careful observer to recognize the plant.

“In May and June the seeds germinate, each sending up on a slender red stem two narrow green leaves about an inch long and somewhat similar in appearance to shoots of grass. Between these seed leaves a short stem soon appears bearing slender spine tipped leaves, which later produce branches in their axils (Plate II, Fig. b). * * * * Until dry weather begins the plants grow rather slowly, but they store up an abundance of moisture in the succulent leaves and branches. During the dry weather in August the moisture disappears from the slender leaves and they wither and sometimes fall off. New shoots are formed which at first are short and densely crowded with spine pointed leaves less than half an inch long, but later elongate so that the leaves become separated at intervals of one-sixteenth to one-half inch (Plate II, Fig. a). Each leaf is accompanied by two bracts similar to the leaf itself, all spine tipped and projecting at almost right angles to the stem. A single, small, stemless flower grows in a cup-shaped depression formed by the bases of the two bracts. The outer parts, or perianth, of the flower are thin and paper-like in texture, spreading, when fully open, about one-fourth inch, and are usually bright rose color (Plate II, Fig. d). If the flower is taken out and carefully pulled to pieces a small, pulpy, green, coiled body appearing like a minute, green snail shell will be found (Plate II, Fig. f). This is the embryo or miniature plant. As the seed ripens its coat becomes of a dull gray color, and at maturity the whole seed is about one-sixteenth of an inch in diameter, irregular in form, and of about one-half the weight of a flax or clover seed (Plate II, Fig. e).

During August and early September the plants become rigid throughout and increase rapidly in size, often growing 2 or 3 feet in height and 4 to 6 feet in diameter, forming a dense, bushy mass of spiny branches (Plates I, III, and Plate II, Fig. a). By the middle of September the exposed parts of the plants have usually changed in color from dark green to crimson or rose red. When the ground is frozen in November the entire plant, except the seed, dies. The root is broken by

*The frontispiece, Plate I, has kindly been loaned to this Station by the Ohio Station; and for the use of Plate III we are indebted to the Wisconsin Station.
ITS PERNICIOUSNESS.

The Russian Thistle has no good points worthy of consideration. Some claims have been made for it as a forage plant, but its value in that direction should have no weight whatever when it is understood that it has no advantage over many others with no noxious qualities. It cannot be eaten by stock on the range except during the summer months (June and July), when other palatable feed is abundant.

In cultivated grounds it is a weed first, last, and all the time, robbing the soil and crowding out the crops. This is especially its history in grain fields, where it not only greatly reduces or exterminates the crop, but greatly impedes the process of harvesting, damages the machinery, and injures the horses' legs to such an extent as to form festering sores.

The large, rigid plants greatly interfere with all farm operations, and the dry plants, when banked against fences, corrals and stock yards offer inviting pathways for chance fires.

METHODS OF CONTROL.

It is an annual, hence if plants are not allowed to produce seed it will soon be brought under control.

It is not difficult to kill; if plowed completely under or if cut down with a hoe it dies; if mowed off below all of its branches at proper times it will suffice. If cut or mowed after blossoming the seeds are often matured from the sap of the somewhat succulent stems, hence all plants approaching maturity must be burned to make sure that they will not distribute any seed.
The Wois"t Weeds of Wyoming.

As it is rather inconspicuous when young, but develops rapidly and to such enormous proportions late in the season, cultivated, and in fact all suspected areas need to be gone over in late August or early September to see that no isolated individuals have been overlooked.

Vigilance, and the free use of the plow and harrow, the hoe and the scythe, will soon rid a farm of it, but unless there is the completest co-operation of all the residents of a community the ground will soon be re-seeded again. It is just as essential to its extermination that my neighbor shall destroy them on his place as that I destroy them on mine. This will not happen till we have a thoroughly aroused public sentiment, backed by a just and enforceable law. To secure this sentiment it should only be necessary to make thoroughly known the character of the weed and the dangers that it threatens, and to furnish means for its recognition. On these points it ought to be made impossible for any one to remain in ignorance. As Mr. L. H. Dewey has said*, "make the pupils in the schools familiar with it, teach them to destroy it, as they would a rattlesnake, wherever they see it." Let the watchword be: "Kill it."

When it is known that in some counties in our neighboring States this pest is in such complete possession that many farmers are abandoning their fields in despair, and that farm valuations on account of it are greatly diminished, it ought to spur us all on to secure its extermination in Wyoming while it may yet be within our control.

PLATE IV.*—SQUIRREL-TAIL GRASS (Hordeum jubatum L.)

*This excellent plate, as well as plates V, XI, XII and XIII, we are able to present through the kindness of Prof. Chas. S. Crandall, Botanist of the Colorado Station. The weed conditions of the two States are so similar that we were glad to avail ourselves of the excellent work that had been done for Bulletin 23, "Colorado Weeds," in which these plates first appeared.
SQUIRREL-TAIL GRASS,
Fox-Tail, Wild Barley (Hordeum jubatum L.)

In a State where hay forms so staple and important a crop as in Wyoming, the worst weed of our meadows must receive attention. In the opinion of the writer there is no one weed that so much concerns hay producers and hay users as this. Not because it is ever likely to take complete possession of our lands, as the Russian Thistle threatens to do, but because, so long as it is endured in our meadows, much hay must be quite unfit for use. How any one who knows its worthless character and the injuries that it inflicts upon stock can for a moment think of using hay in which it is found in any appreciable quantity, is incomprehensible. Selfish interests, as well as humane considerations, forbid its use.

This annual grass is, as soon as it heads, a pest and only a pest. Its light seeds, armed with the long barbed bristles, are carried everywhere by the wind, in the waters of our irrigating ditches and on our streams, and even by animals in their hair and wool.

With such easy dissemination the plant readily spreads to all fields where suitable conditions are offered. Unfortunately suitable conditions are often unwittingly created by the ranchman himself. By over-irrigation, particularly during the spring months, the native or cultivated grasses are wholly or partly killed out and the vacated soil is promptly occupied by this hardy indigene.

Being an annual it is not so very difficult to bring it under control. Infested meadows may be cut before the Squirrel-Tail heads, and if they are cut a second time during the season this will practically exterminate it, if fence
corners and turning rows are not maturing plants for the re-seeding of the ground.

Where it is in complete possession of a meadow the safest and best means is to break up the ground and plant to a cultivated crop for a year or two. This is always effective and probably the shortest road to a well-sodded meadow again, for the considerable presence of this weed in any field indicates that the better grasses have run out.

In this State there are many valuable meadows of native grasses which are being ruined by injudicious methods of irrigation. Constant flooding drowns out the better grasses, which are then replaced by seeds and rushes, or, worse yet, by Squirrel-Tail Grass. It is to be hoped that more judicious methods may prevail, and that the remarkably nutritious native grasses may still be saved in many meadows.

No description of this is needed; it is known to all, or if not, may easily be recognized from the accompanying plate.

More complete information as to the structure, the mode of dissemination, the injuries resulting from this weed and the best methods of exterminating it, can be obtained from a bulletin by the writer*, No. 19 of this Station, and from one by Prof. L. H. Pammel†, of the Iowa Station.

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**COCKLE,**

*Cow Herb (Saponaria vaccaria L.)*

Cockle is known to all the farmers of this State by name at least. Many have learned to know it at sight by reason of much bitter experience. This is at present the

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*Squirrel-Tail Grass (Fox-Tail), One of the Stock Pests of Wyoming.
†Bulletin No. 30, Expt. Station, Ames, Iowa.
PLATE V.—COCKLE (Saponaria Vaccaria L.)
worst weed in grain fields. In cultivated fields it causes very little trouble, as it is as readily destroyed as other weeds; but in fields of spring wheat, especially, much damage is done by this plant. Springing up with the wheat the latter is crowded out, shaded out, and robbed of the food it might otherwise get from the soil. The result is a greatly reduced crop of inferior quality.

Like most of our bad weeds it is an introduction from Europe, but it is so well established now in this country and in the wheat growing sections of Wyoming that where it came from is only of historical interest. How to keep it out of our grain fields is a practical question, and I think one which can be answered.

This is a case where prevention, rather than cure, must be sought. A field well seeded to Cockle, as well as wheat, is practically beyond redemption. The remedy lies in clean seed on clean ground. This is not so difficult of attainment as many suppose. Suspected seed wheat, if it must be used, should and can be cleaned by screening. This should be sown on clean ground. Let the ground known to be full of Cockle seed be used for cultivated crops till the Cockle has been exterminated. To avoid having to fight and endure loss from it every year see that road sides, fence rows and vacant grounds are not maturing plants and seeds to undo all your other work.

This annual may be known by its smooth, opposite leaves, united by their bases, by its rather large pink flowers in a strongly five angled calyx which becomes much enlarged in fruit. It usually grows 18 inches to 2 feet high and branches above.

These characteristics in connection with the figure of
it (Plate V), will enable any one to determine suspected plants.

CANADA THISTLE,

(Carduus arvensis Robs.)

This is one of the true Thistles and not merely one in name. It has been talked of and written of for years throughout the United States, and as a result it has come to be so dreaded that wherever it has appeared relentless war has been waged upon it. This, however, has not exterminated it, but it has kept it in check. That this commendable vigilance against this foe might not relax, many States have placed this in the list of weeds proscribed by law; in fact, it was among the first, if not the first, against which laws were enacted.

This weed is now in Wyoming. The writer found a patch in a stock yard on a farm near Sheridan in July of this year. It was also reported from there, with specimens, in 1895. It is probable that some effort was made to exterminate it at that point, but it is very probable that it has entered the State at other places.

Every one should be on the lookout for this invader, as it is comparatively easy to dig out a few, but when a large area is infested it is a costly undertaking. I use the words *dig out* advisedly, for it cannot be destroyed by ordinary methods.

It is a perennial plant; that is, it lives for a number of years, dying down to the ground only, each year. It is reproduced by seeds, which are furnished with a tuft of hair, that the wind may the more readily carry them long distances. This accounts for the rapidity with which it
FLATE VI.—CANADA THISTLE (Carduus arvensis Robs.) Entire plant, showing habit of growth.
spreads, but the difficulty of killing it out where it has become established is quite another matter. Examination reveals the fact that each plant is furnished with a number of long, slender, underground stems, which at intervals give rise to new above ground stems. This, then, is a second means of reproducing the plant, and gives it its well-known tenacity of life. Ordinary stirring of the soil only increases the number of individuals, as each piece of the broken up underground stems promptly sends up a new shoot.

It can be destroyed. The first rule is that it must not be allowed to seed, otherwise new areas will be infested by the seeds blown away by the wind. To destroy it where established, if the area be large, recourse must be had to some method of cultivating the soil which shall entirely keep down the above ground parts, thus starving to death the underground stems. All underground parts,
while capable of living for a time without food, ultimately require food prepared for them in the leaves of the plant. Any method then which shuts off this source of supply will be effectual. Repeated plowing may be depended upon, but only an occasional stirring of the soil, especially if the ground be wet, is of advantage to the weed.

In small areas dig them out entire, smother them by building stacks over them, or keep them cut below the surface for a season, or two if necessary.

That all may recognize this weed and attack it at once wherever it appears, two figures are given, one (Plate VI*) showing the plant entire, and the other (Plate VII†) showing some of the heads more in detail.

It grows two feet or more in height, is usually green and smooth, with weak prickles upon the margins of its lanceolate leaves. It branches freely, producing numerous, rather small (one-half inch) heads with rose purple flowers. It may be known from the Bull Thistle, described next, by its underground stems and by the absence of wing-like margins on the stem and of cottony wool on the under surface of the leaves.

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**BULL THISTLE,**

*Common Thistle (Carduus lanceolatus L.)*

This large, common, roadside Thistle must be familiar to every one. It also has come to us from Europe, and, like the Dandelion, almost keeps pace with civilization. It is introduced into new areas chiefly in seeds, grains, hay, and the packing materials of goods imported.

*Through the courtesy of the officers of the Oregon Station we are able to present this plate of the Canada Thistle, as well as the two of the Bull Thistle.*

*For the use of this plate we are indebted to the Illinois Station, as we are also for Plates X and XV, used in this bulletin.*
Those not familiar with it may know it by the following description* and figures (Plates VIII and IX).

"It is a biennial, producing the first year simply a tuft of large, spiny leaves spread out flat upon the ground;

the second year it sends up a stout, erect, branched stalk, two to four feet high, blooms, bears seed and dies. It may be distinguished from the Canada Thistle by the large flower heads (1 to 1½ inches in diameter), and the wider, stemless leaves, cobwebby beneath, with margins running down the stem as ragged wings, which make the stalks very prickly."

*By Prof. Moses Craig, in Bull. 32 of Oregon Station.
Plate IX.—Bull Thistle. Mature plant as it appears the second year.
This Thistle is not so difficult to exterminate as the Canada Thistle, and if no plants were allowed to seed for two years the work would be done. The plants are themselves readily killed, for if cut below the short crown they rarely come up again. This can be done quickly with a tool called, by Mr. L. H. Dewey, a spud*. This is a chisel shaped tool with a long handle. The writer has found a carpenter's stout, narrow chisel effective, but more rapid work could be done with a heavier tool on a long handle. A single thrust ought to suffice to cut the largest plant two or more inches below the surface.

The weed gives no trouble in cultivated ground, but often becomes a nuisance of the worst sort in pastures. The large rosette of leaves and the spreading branches, with their long, formidable spines, not only reduces the productive power of the land, but renders unavailable the grass that does grow, for few browsing animals venture to contest with the Bull Thistle its pre-empted area.

It also springs up along roadsides, in waste ground, and even in lawns, in all of which it produces a most slovenly and unsightly appearance. A few weeds left to fruit in such places will render of no avail what has been done in the field; the wind catches the seed with its tuft of hairs and whirls it along, possibly for miles, and the new crop of course proves just as troublesome as the first.

WILD OR PRICKLY LETTUCE,
Compass Plant (Lactuca Scariola L.) Plate X.

Once more Europe has furnished a most vigorous but insidious foe. Though introduced into this country nearly a quarter of a century ago, it is only within the last few years that this tramp has attracted universal attention. In some respects a rather inconspicuous plant, it established itself everywhere before it came under the ban. It is even more widely dispersed than the Russian Thistle, for it has spread from ocean to ocean. In Wyoming, however, it is still rare, only one patch having been observed, viz: on the Cheyenne and Northern, in the Platte Canon. In many other States it has become so abundant that its extermination is no longer considered a possibility*.

It should be an easy matter in Wyoming, where it has no serious foothold as yet, to keep this pest in complete control. It is an annual weed, no more difficult to kill than most annuals, except for the large number of seeds so widely dispersed by the wind.

Prevention of seeding is the remedy, and if the plant is half so troublesome and unsightly as it is said to be elsewhere, the farmers of the State will do well to learn to recognize it. Let the first plants that appear be uprooted before any seeds are mature.

The following points are selected from Dr. J. C. Arthur’s bulletin, already cited.

*It is closely related to the garden lettuce, having many of the same characteristics, but with the edge and midrib of the leaf and the lower part of the stem beset with weak prickles. It blossoms in July and August.

* * * Correspondents, and writers in the press unite

*See Bull. 52, Vol. V, 1894, of the Indiana Station, Dr. J. C. Arthur.
PLATE X.—PRICKLY LETTUCE (*Lactuca scariola* L.) Showing its usual form of growth; also its habit of sending out new shoots if cut off.
in considering this a prominent and disagreeable weed. The plant has many of the qualities of a successful intruder as well as an uncompromising weedy appearance.* * * It becomes an important portion of all weed patches. * * * When the top is injured sprouts are sent out from the base of the stem in a very troublesome manner. * * * The plant has a curious habit of twisting its stem leaves into a vertical position, with the edges directed north and south. It is one of two well marked compass plants. * * * Remember the persistent habit of the plant to throw out sprouts unless cut off below the surface of the ground. * * * A suitable weed law should exist so that dilatory land owners may be brought to action."

**BUFFALO BUR,**

*Beaked Horse-Nettle (Solanum rostratum Dunal.)* Plate XI.

We will now consider very briefly one of the native weeds which has in other places been very strongly condemned, viz: the Buffalo Bur. It has been observed in several places in the State, usually in sandy ground. From no locality has it been reported as a bad weed, and it is mentioned here chiefly because it has proven that it has weed qualities. It is travelling eastward from the western plains, and in spite of all precautions seems to be establishing itself victoriously in all of the Mississippi valley States. Since it has shown its qualities elsewhere it is just as well to give it no quarter here.

It is a branched annual, one or two feet high, with a rather large lobed leaf. It may be known by the stout yellow prickles which cover both stem and leaf; by the
PLATE XI.-BUFFALO BUR (Solanum rostratum Dunal.) A small plant.
yellow flowers, nearly an inch across, shaped like the blossom of the tomato and potato, to which it is botanically related, and by the horridly prickly calyx which permanently encloses the fruit. The enlarged calyx with its yellow spines produces a bur-like effect, and explains the origin of its common name.

POVERTY WEED

*Iva axillaris* Pursh. Plate XII.

This is a bad weed to get rid of when once introduced, but fortunately it is not generally prevalent. It is a perennial, with running underground stems, the breaking up of which by plowing or hoeing only enormously multiplies the weed. It must be dug out entire or the root stocks starved to death by keeping down all leaves and stems. This can only be done by very frequent cultivation. Infested ground can also be cleared by smothering the weed with heavy seeding to grain or Alfalfa, or better yet, a close sod of the common meadow grasses.

It grows 6 to 10 inches high, branches somewhat and forms dense patches in favorable soil. In the axils of the oblong leaves are produced small, yellow, drooping heads, which produce a moderate amount of seed.

PERENNIAL FRANSECTION

*(Franseria discolor* Nutt.) Plate XIII.

For this plant no common name is known to the writer, so Perennial Franseria may be adopted. Botanically it stands near the Ragweeds, as does also the Poverty
The Worst Weeds of Wyoming.

Weed. Like the Poverty Weed, it is a perennial, and may be compared to that in its mode of life and reproduction. It is more common in the State and still more difficult to eradicate, as it adapts itself to all soils. It has been reported from some localities as defying all attempts to remove it. It readily crowds out all garden or cultivated crops unless hand weeding is repeatedly resorted to. The same methods for its control as for Poverty Weed are suggested. The accompanying plate shows two characteristic plants. They usually grow so densely, however, as to cover the ground as with a mat, and are 4 to 6 inches high. The flower stock overtops the dissected leaves, which are green on the upper surface and whitish beneath.

Another species of this genus (*Franseria Hookeriana Nutt.*), is common in sandy soil, but has not been reported as a weed. It produces a very spiny bur-like fruit.

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THE PIGWEEDS

(*Amaranthus*) Plates XIV and XV.

The Pigweeds, of which there are several species, are found in nearly all cultivated grounds throughout North America. Originally the forms that are now commonest were confined to tropical and western America. These are Thorny Amaranth (*Amaranthus spinosus* L.), Common Pigweed (*Amaranthus chlorostachys* Willd.), Rough Amaranth (*Amaranthus retroflexus* L.), Low Amaranth (*Amaranthus blitoides* Wats.), and Common Tumbleweed (*Amaranthus albus* L.). Only the last three of these are common in Wyoming, and the last two are indigenous. They are all annuals, and attract no particular attention
except in cultivated ground, where, if once established, they furnish seed enough each season for several bountiful crops successively produced, springing up afresh after each cultivation of the land.

Of the Rough Amaranth I am unable to present a figure, but it may be known from our other Pigweeds by its erect habit and short, thick, erect spikes, which are almost as long as the terminal one.
The Worst Weeds of Wyoming.

The Low Amaranth branches from the base, and has a decided spreading habit, being in many instances quite prostrate. Plate XIV* shows the end of one such branch. In several instances farmers have pronounced this their worst weed.

**Plate XV.—Common Tumbleweed (Amaranthus albus L.)** This is the plant most frequently mistaken for the Russian Thistle.

The Common Tumbleweed is frequently mistaken for the Russian Thistle, which it closely resembles in form. It may, however, be easily distinguished, for this has flat leaves, the Thistle never has; this has no spines, the floral bracts only becoming somewhat prickly when dry. Plate XV† shows it as a well developed tumbleweed.

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*From Bull. No. 21, Nevada Station, through the kindness of Prof. F. H. Hillman.
†This, as well as Plate X, originally appeared in Bulletin No. 39 of the Illinois Station, by the courtesy of whose officers we are permitted to present them here.
The remedy for all of them is clean seed and clean cultivation. Clean cultivation once inaugurated makes each successive year easier and easier. This self-evident truth applies to other weeds as well as the Pigweeds.

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**DANDELION**

*(Taraxacum officinale Weber.)*

This is known to every one, and needs neither description nor illustration. It need not be considered as a weed but for the trouble it gives in lawns. Here it is pre-eminently the worst, for it establishes itself in even the most compact sod.

It is easily destroyed by destroying the lawn, but in Wyoming lawns represent too much time and labor to be sacrificed except as a last resort. It could easily be kept in control on individual lawns except for the crop on your neighbor's neglected lot and on the margins of the irrigating ditches in our streets. These furnish seeds enough, all with full spread sail, to re-establish the weed as often as you care to remove it. No remedy can be suggested except that each lot owner be urged or required to keep his own premises clear, including the streets and alleys adjacent to said lots. Until that is done there can be only eternal warfare and no respite from the service. When that is done the contest will soon be an easy victory for the lawn owner.

To remove this perennial from the lawn the best implement is a strong, but narrow (one-half inch) carpenter's chisel. With this the rootstock can be quickly cut some inches below the surface without injury to the grass. Unless cut low in the ground it comes up again.
Various remedies have been tried, such as salt, coal oil, etc., applied to the cut rootstocks, but, besides being too much labor, it is unsatisfactory at best. Unless applied in large quantities it is not effectual, for the Dandelion is hardier than the crop, and large quantities, besides being expensive, kill the lawn as well as the weed.

Plants cut out when in bloom should be burned, for otherwise they even then mature their seeds and send them off on every breeze.

To those in other States who may read this I will state that in Wyoming the Dandelion has apparently found its most congenial home. It is here in full growth and blossom from early spring till late autumn.
While it does not seem best to consider any more of our weeds in detail at present, it may be worth while to make record of those that have attracted some attention within the State.

Enumerating first those already discussed without further comment, the others follow with the very briefest data*.

1. **Russian Thistle** (*Salsola kali Tragus* Moq.)
2. **Squirrel-Tail Grass** (*Hordeum jubatum* L.)
3. **Cockle, Cow Herb** (*Saponaria vaccaria* L.)
4. **Canada Thistle** (*Carduus arvensis* (L.) Robs.)
5. **Bull Thistle, Common Thistle** (*Carduus lanceolatus* L.)
6. **Wild or Prickly Lettuce** (*Lactuca scariola* L.)
7. **Buffalo Bur, Beaked Horse-Nettle** (*Solanum rostratum* Dunal.)
8. **Perennial Franseria** (*Franseria discolor* Nutt.)

9. **Pigweeds**
   - Rough Amaranth (*Amaranthus retroflexus* L.)
   - Low Amaranth (*Amaranthus blitoides* Wats.)
   - Common Tumbleweed (*Amaranthus albus* L.)

10. **Dandelion** (*Taraxacum officinale* Weber.)
11. **Poverty Weed** (*Jva axillaris* Pursh.)
12. **False Flax** (*Camelina sativa* Crantz.)

Troublesome in grain, observed but once, Parkman, July, 1896.

13. **Skeleton Weed** (*Lygodesmia juncea* Don.)
    Grain fields and cultivated grounds; perennial, dig it out, common.

14. **Wild Tomato** (*Solanum triflorum* Nutt.)
    Very annoying in gardens and truck patches; annual, prevent seeding.

15. **Dock, Sour Dock** (*Rumex salicifolius* Wienm.)
    In meadows, perennial, hard to eradicate; dig out, prevent seeding.

*For brief notes upon these and other weedy plants, as to locality, date of collection, etc., see Bull. 28, First Report on the Flora of Wyoming.*
18. **Purselane**, Pusley (*Portulaca oleracea* L.)
   Becoming common in rich field and garden soil; Sheridan and Wheatland, July, 1896.

19. **Common Crab Grass**, Polish Millet (*Panicum sanguineum* L.)
   Troublesome in garden crops, perennial; "hit it with a hoe."

20. **Great Ragweed** (*Ambrosia trifida* L.)
   Margins of fields, fence corners and yards, unsightly; mow it.

21. **Mallow** (*Malvastrum coccineum* Gray.)
   Cultivated ground and door yards, perennial; dig it out.

22. **Prickly Pear Cactus** (*Opuntia polyacantha*, several varieties.)
   A nuisance on the range and in pastures; cultivation and water kills it.

23. **Bur Grass**, Sand Bur (*Cenchrus tribuloides* L.)
   Sandy ground; prevent seeding by clean cultivation.

24. **Dodder** (*Cuscuta*, several species.)
   Troublesome in Alfalfa and Flax; remedy, rotation of crops.

25. **Green Fox-Tail** (*Setaria viridis* Beauv.)
   In cultivated grounds; pull up and prevent seeding.

26. **Sunflower** (*Helianthus annuus* L.)
   Waste ground; plow under and prevent seeding.

27. **Cockle Bur** (*Xanthium Canadense* Mill.)
   Cultivated ground, southeastern part of the State, annual; clean cultivation the remedy.

28. **Sow Thistle** (*Sonchus asper* Vill.)
   Reported as spreading at Evanston; prevent seeding.

29. **Yellow Flax** (*Linum rigidum* Pursh.)
   Grain fields; rotation of crops, clean culture.

30. **Hedge Bindweed** (*Convolvulus sepium* L.)
   Still rare, Cheyenne; thorough late cultivation.

31. **Wild Oats** (*Avena fatua* L.)
   Not uncommon in oat fields; clean seed, rotation of crops.

32. **Wild Buckwheat**, Black Bindweed (*Polygonum convolvulus* L.)
   Common in grain fields and truck patches; clean seed and cultivation.

33. **Lamb’s Quarters** (*Chenopodium album* L.)
   Common in all cultivated grounds; clean cultivation.
34. **Ragweed**, Roman Wormwood (*Ambrosia artemisiifolia* L.)
   - Laramie, Cheyenne, Sheridan; in grain fields and cultivated ground.

35. **Rib Grass**, English Plaintain (*Plantago lanceolata* L.)
   - Reported only from Lander; clean seed and prevention of seeding.

36. **Porcupine Grass** (*Stipa comata* Trin.)
   - An annoying and worthless grass.

37. **Poison-Weed**, Larkspur (*Delphinium Geyeri* Greene.)
   - Very abundant in places. This is the plant which hungry cattle sometimes eat voraciously, in which case it often causes fatal bloating.

38. **Loco**, Loco-Weed (*Oxytropis Lamberti* and its varieties.)
   - Very common, said to cause the peculiar mental disorder in horses known as "loco."

39. **Gum Plant** (*Grindelia squarrosa* Dunal.)
   - Troublesome in lawns and meadows; prevent seeding.

40. **Wild Mustard** (*Brassica sinapis* Boiss.)
   - Only single specimens observed. A bad weed, pull it out.

41. **Shepherd's Purse** (*Capsella Bursa-pastoris* Medic.)

42. **Rocky Mountain Bee-Plant** (*Cleome integrifolia* T. & G.)

43. **Wild Liquorice** (*Glycyrrhiza lepidota* Pursh.)

44. **Stick-Seed** (*Echinospermum Lappula* Lehm)

45. **Goose Grass**, Door Grass (*Polygonum aviculare* L.)

46. **Perennial Ragweed** (*Ambrosia psilostachya* DC.)

47. **Spanish Needles** (*Bidens frondosa* L.)

48. **Marsh Elder** (*Iva xanthifolia* Nutt.)

49. **Pepper Grass** (*Lepidium apetalum* Willd.)

50. **Wormwood Sage** (*Artemisia biennis* Willd.)
Suggested Weed Legislation.

AVEN NELSON.

THE SITUATION IN WYOMING.

Wyoming has a weed law*. Is it effective? Let the facts in regard to the Russian Thistle and other weeds set forth in the preceding pages answer.

Wyoming needs some new weed legislation now if it is to be of the greatest possible service to the State. We may need such legislation more some years hence, just as he who is seriously ill needs a physician more than he who has the incipient stages of the malady. Prevention is always better than cure, but when a physician must be called the chances for the patient are better if he be called promptly. Vast sums of money are being expended in other States to cure an evil which is, so to speak, only at our threshold. Prompt action, with the expenditure of only a nominal sum, will do much to protect us against the weed foes which are just beginning to make themselves felt.

The notion has long prevailed that this is a grazing State solely, that the flocks and herds run on the open range, and that these, with the mines of our mountains, constitute our wealth. It is time for such notions to cease. Our agricultural interests have had a marvelous development. In some counties they are paramount, and in all equal to any other single interest.

The open range stock business, with its hazards, is

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*Session Laws of 1895. Russian Thistle and Canadian Thistle are proscribed. No method is provided for bringing this fact before the people or the officers concerned; neither are any means suggested by which these plants may be recognized. The act is printed in full at the close of this bulletin.
giving place to more conservative methods. Smaller, but more numerous herds, individual rather than company ownership, pastures accessible from the ranch or farm, hay and feed during severe weather, are changes which are placing this interest upon a safe business basis. As this comes to be the status of affairs, farming, with all that that implies, is inseparable from it. Let our mines develop beyond the expectation of the most sanguine, our agricultural interests, in the inclusive sense of the term, must yet be the source of much of our wealth. In this vast empire of 100,000 square miles there are other interests than those of the mines and the old time range stock business. Let him who doubts this visit the different counties, and he will see many prosperous and happy homes on well kept farms. The prosperity of our farmers is inseparable from that of the State. Let their interests be conserved by legislation which will not leave them to fight their weed foes unaided. Several lines of railroad are operated within the State, and it is to be hoped that we shall soon have more. Inseparable adjuncts of civilization as they are, they are also, for reasons previously stated, the principal means for the introduction of new weeds into the State. Let it be said, however, to the everlasting credit of railroad corporations, that they have shown themselves more ready to comply with the spirit of weed laws than have many individual citizens. It is hardly to be expected, however, that said corporations will concern themselves with what is never called to their attention.

The danger points at present are not the ranches and farms, but the right of way of the railroads, our public highways, and especially the vacant grounds in our towns and cities. All of these danger points may be guarded if
the matter is officially brought to the notice of the parties concerned.

**LEGISLATION.**

It may be objected that with so much unoccupied territory weed laws cannot be enforced, but as I have endeavored to show it is not the unoccupied territory that is the source of danger. It is this unoccupied territory, as well as our fields and farms, that we would protect.

No one thinks for a moment that weeds can be legislated out of existence, but there are two or three of foreign introduction that the State as a whole is interested in repressing, and that, by united action, can be kept in subjugation. Grain growing communities cannot afford to admit the Russian Thistle, neither can those who are interested in pasture and range grounds afford to permit its occupancy of these.

A large majority of the States and territories have laws relating to certain weeds. Every year of late sees one or more of those without such legislation falling into line. No State has ever repealed such legislation except to substitute more timely acts for those repealed. Judging by these facts one infers that such laws have been found profitable elsewhere. This State needs such safeguards more than the compactly settled commonwealths.

Mr. L. H. Dewey, Assistant Botanist to the Department of Agriculture, has for several years been studying the weed question in all of its aspects. The weed legislation of the several States has come in for its share of attention. He has personally investigated the operation of said laws in respect to the objects sought to be attained. After such study of the whole subject he has published*  

"a form which outlines the essential provisions of a general State weed law."

This form seems to embody all that is practical in this line of legislation, and has received the endorsement of the chief officials of the Department of Agriculture.*

Taking this form as a basis, and modifying it so as to adapt it to the conditions in this State, having respect all the while to the fact that the expenses attendant upon such a law must be reduced to the minimum, the following form is respectfully recommended to the Legislature of this State for its consideration as a substitute for the present law upon the subject†.

AN ACT FOR THE EXTRIPATION OF SUCH WEEDS AS ARE MOST INJURIOUS TO THE AGRICULTURAL INTERESTS OF THE STATE OF WYOMING:

Be it enacted, etc.:

SECTION I. A permanent commission, to be known as the State Weed Commission, is hereby created, to consist of the Professor of Botany of the University of Wyoming, who shall be known as the State Botanist, and three eminent farmers or ranchmen, who shall be appointed and commissioned by the Governor, with the consent of the Senate, from among the farmers or ranchmen who may be members of the Legislature during the two years following such appointment. They shall hold their offices for a term of two years, or until their successors are appointed. The Governor shall have power to fill all vacancies that may happen in the commission during the recess of the Senate, by granting commissions, which shall expire at its next session‡.

*I quote from the letter of transmittal of the bulletin cited: "I have pointed out in my annual report for 1894 the fact that, since the total value of our principal field crops for the year 1893 was $1,760,480,273, an increase of only 1 per cent., which might easily have been brought about through the destruction of weeds, would have meant a saving to the farmers of the nation of about $17,000,000 during that year alone. The passage of effective weed laws, like the one outlined and discussed in this report, is of the first importance in dealing with this problem." This letter was signed by Dr. Frederick V. Coville, Chief of the Division of Botany, and directed to the Hon. J. Sterling Morton, Secretary of Agriculture, who undoubtedly approved of the publication of the bulletin under consideration.

†The original form, of which this is largely a copy, "was carefully revised by a jurist familiar with legal usages and constitutional requirements."

‡For full explanation of each of these sections, with reasons for their several provisions, see the bulletin previously cited. The reason for the suggested composition of the commission is as follows: "The technical knowledge of the botanist and the practical knowledge of the farmers on the commission are needed together to decide what ought to be done and what is really practicable."
Suggested Weed Legislation.

SEC. 2. Said commission shall meet biennially at the Capitol on the next week day immediately following the adjournment of the Legislature, and shall be in session for a period not exceeding two days; and for such service each commissioner, who is not a salaried officer of the State, shall be entitled to be paid $\ldots\ldots\ldots$ dollars a day for each day's actual attendance at the biennial session; said compensation and the necessary expenses of the commission for stationery, printing and postage shall be paid by the State Treasurer out of any moneys in the treasury, not otherwise appropriated, upon vouchers issued by the secretary of the commission and approved by the chairman.

The members of the commission being members of the Legislature, the short session at its close will not impose upon them any serious hardship, and the cost to the State will be only nominal.

SEC. 3. The Governor shall, when necessary, assign a room at the State Capitol for the use of the commission in which to hold its biennial sessions. Three commissioners shall constitute a quorum. The State Botanist shall be custodian of the records, and, when present, be chairman of the commission.

SEC. 4. Said commission, or a majority thereof, shall determine during its first session what species of weeds, not exceeding three in number, are most injurious to the interests of the State, and shall prepare a list thereof, to be known as Schedule A of this act, which shall state the common and technical names of such weeds and the time or times of year at which they can be most advantageously destroyed, and shall contain a concise description of the best economical methods for their destruction. Said schedule may thereafter be modified at any biennial session of the commission by a majority thereof: Provided, That not exceeding the above number of species of weeds shall be included in any biennial schedule.

SEC. 5. When, at its first session, or at any biennial session thereafter, the commission shall have adopted a schedule, or shall have modified one previously adopted, as above provided for, it shall be the duty of the chairman to have a sufficient number of copies of this act, with such schedule annexed, printed and distributed by mail in the following manner: One copy to each State, county and township officer, and one copy to each daily and weekly newspaper published within the State; and the schedule so adopted or modified shall be published in the same manner as the public statutes are published.

"The thorough advertisement of weed laws will do much to secure their observation. Unlike criminal laws, which apply chiefly to men who have little respect for right and justice aside from the fear of penalty, the weed
laws apply usually to men who obey the laws without compulsion by the courts, and in most cases a knowledge of the law will be sufficient warning to enforce its provisions. Copies should be sent to agricultural and other papers for publication, so as to disseminate a knowledge of its provisions as widely as possible among the people.”

SEC. 6. It shall be the duty of every owner, lessee, or occupier of land in this State, and of every owner, lessee, or occupier of any city, town, or village lot, upon whose land or lot any of the weeds named in the schedule provided for in this act shall be found growing, to destroy the same or cause them to be destroyed at or before the time or times mentioned in said schedule, and in the mode therein described, or in such other manner as shall absolutely prevent the ripening and spread of their seed.

“In nearly all cases the land owner can do this work at much less cost than it can be done by the public authorities, and in arable fields it can usually be done in the ordinary operations of cultivation.”

SEC. 7. The city marshal in incorporated towns and cities, and the road supervisor in each county are hereby constituted weed inspectors for towns and cities, and for the county outside of such towns and cities, respectively.

SEC. 8. In case of the neglect or failure of any owner, lessee, or occupier of any land or lot within this State to destroy thereon the weeds mentioned in Schedule A at or before the times mentioned in said schedule, any person owning or having in charge any land or lot within the same township may complain in writing, stating the names of the weeds, the location of the land, and the name of the owner, to the road supervisor or the officer having in charge the highways or streets of the township, city or village within which the weeds complained of are growing. In every such case the complainant shall send with his complaint a written agreement to pay the said highway commissioner or other officer above designated his reasonable expenses incurred in the inspection of the land complained of on which any of the weeds mentioned in the schedule are not found. Upon the receipt of such complaint it shall be the duty of said road commissioner, or other officer, to inspect the land or lots mentioned in the complaint, and if any of the weeds mentioned in Schedule A are found growing thereon he shall notify the owner, lessee, or occupier of the land in writing to destroy them, and if the weeds are not destroyed at the expiration of five days after service of notice, he shall employ such labor as is necessary and enter the lands and destroy

*The comments following Sections 5, 6, 10 and 12 are also by Mr. Dewey.
in the most practicable and economical manner (or in the manner prescribed in the schedule) all of the weeds mentioned in the schedule that are found growing thereon: Provided, however, That in case there is no resident owner, lessee, or agent responsible for the care of the land the service of notice may be omitted.

SEC. 9. Each road supervisor or other officer, designated in Section 7, shall make an itemized statement, duly verified by oath or affirmation, of the expenses incurred in inspecting each tract of land or lot on which weeds mentioned in Schedule A were found growing, and of all expenses incurred by him for destroying said weeds, which statement shall contain a description sufficient for identification at the office of the county assessor of each tract of land or lot on which such weeds were destroyed under his direction, together with the name of the owner, lessee, or occupier of said tract of land or lot, and he shall deliver each such statement to the county assessor, and a certified copy thereof to the county clerk. He shall also issue vouchers for himself in inspecting weeds, at the rate of [blank] dollars per day, and to each laborer employed in destroying weeds at the rate of [blank] dollars per day, for the time actually employed. These vouchers shall be presented to and audited by the county clerk, who shall indorse thereon the amount he finds due, and then they shall be returned to the payee named therein, or his assigns, or legal representatives, and be paid by the county treasurer out of any moneys not otherwise appropriated, or they shall be receivable for county taxes within the county in which they were issued, to the amounts indorsed thereon by the clerk.

SEC. 10. The county assessor shall assess a special tax on each lot or parcel of land on which weeds have been destroyed by the officers, as above directed, the amount of expenses incurred for inspection and in the destruction of the weeds, as set forth in the verified expense statement received from the inspector. Said taxes shall be collected in the same manner and with like penalties as other county taxes are collected: Provided, however, That the owner, lessee, or occupier or any land or lot in respect to which any such expense statement has been issued, may deposit the amount payable thereon with the county treasurer, and in each such case it shall be the duty of the treasurer to receive the same and give notice of the payment to the assessor.

"The expenses of destroying weeds should be paid eventually by the land on which the weeds were destroyed. It would evidently be unjust to pay them from funds raised by the community, and such a method would create a temptation to have one's weeds pulled at the public expense. To assess persons with the costs, or to punish by fine or imprisonment, involves litigation and per-
sonal difficulties that often cause the law to be inopera-
tive.”

SEC. 11. The State Weed Commission shall have power to prepare and issue all necessary printed forms, notices, and instructions, tending to secure uniformity in employment of labor, statements of expenses, and the rendering of reports.

SEC. 12. Each road supervisor shall, in December of each year, mail to the State Botanist a report in the prescribed form, stating approximately the number of acres in his district on which weeds of each species mentioned in Schedule A were destroyed under his direction during the preceding part of the year, the total cost of destroying them, and the cost of inspecting the land in his district. The State Botanist shall present to the Governor on the first Monday in February in each year, a report of the proceedings of the commission, together with a statement of its expenses, and of the total expenses by counties of inspecting land and destroying the weeds thereon during the preceding year, and of the total number of acres in each county on which weeds have been destroyed as required by this act. And it shall be the duty of the Governor to submit said report to the State Legislature, if then in session, or within the first week of its next regular session.

“A report such as is here proposed will require comparatively little time in compilation, and will aid materially in deciding how much is being done under the law toward the eradication of weeds. It will afford data needed to determine approximately how much the benefits derived from enforcing the law exceed the cost.”

SEC. 13. The wilful resistance to, or wrongful interference with any weed inspector or assistant, or laborer employed by any weed inspector, while in the performance of any of the duties in this act prescribed, is hereby declared a misdemeanor, punishable by fine not exceeding .............. dollars, or imprisonment not exceeding .............. days, or both, in the discretion of the county court, and the county courts are hereby given jurisdiction of all such offences.

SEC. 14. The words, “owner, lessee, or occupier,” wherever used in this act, shall include corporations, companies, associations, or agents owning, holding, occupying, or responsible for the use or care of any lot or land within the limits of this State, and they shall be subject to all provisions of this act in the same manner and with like liabilities as any other owner, lessee, or other occupier of lands or lots, and service of notice upon any agent or officer of any such company, corporation, or association shall constitute service upon said company, corporation, or association.
Sec. 15. It shall be the duty of the road supervisor or other officer directly responsible for the care of public highways in each township or county in this State to destroy or cause to be destroyed all weeds mentioned in Schedule A on the highways within his district, at or before the times mentioned in said schedule, and in such manner as to effectually prevent the production of their seeds. He is hereby directed to warn out labor or to employ labor for this purpose in the same manner as for repairs to the highway, and for neglect or failure to perform this work he shall be subject to the same penalties as for the neglect or failure to perform duties pertaining to the repair of highways.

Sec. 16. The State Weed Commission shall prepare a plan for the eradication of weeds mentioned in Schedule A found growing on lands belonging to the State, and also on lands within the State, the title of which still remains in the Federal Government, and shall report the same to the Governor, to be by him transmitted to each branch of the Legislature during the first week of the next regular session of the Legislature.

Sec. 17. The State Botanist shall at least once in every two years visit each county in the State, and personally consult with the inspectors of said county in order that he may inform himself in reference to the status of the law as respects enforcement, and that he may intelligently and from personal knowledge bring before the commission at its next session the further needs of the State in such matters as are entrusted to said commission. His necessary expenses connected with such visitation, and with his attendance upon the biennial session of the commission, shall, upon presentation of a certified voucher, countersigned by the secretary of the commission, be paid by the State Treasurer in the same manner as are the other expenses of the commission.

The suggested bill seems to provide for all that is at present practicable, and if supported by a healthy public sentiment, will meet the necessities of the case. It has one feature that should commend it heartily, viz: its small demands upon the revenues of the State. It involves no expenditures on the part of the State except the necessary expenditures of the commission, which need not exceed a very few hundred dollars for each biennium. The expense of enforcing the law falls finally upon the negligent land owner or corporation, and no opportunity for annoying or expensive litigation seems to be opened up by this law.
OUR WEED LAWS AS AT PRESENT NOMINALLY IN FORCE.

For the information of those of our citizens who may receive this bulletin, a copy of our weed legislation as it now exists is given in full:

Be it enacted by the Legislature of the State of Wyoming:

SECTION 1. It shall be the duty of every person, company, association of persons, railway company, corporation and municipal or public corporation in this State to destroy or cause to be destroyed on all lands or premises owned, leased, occupied, controlled or used by such person, company, association or corporation, and upon all rights of way owned, used or occupied by either of them, the noxious weeds hereinafter mentioned, namely: the Salsola kali tragus, commonly known as the Russian Thistle and the Canadian Thistle.

SEC. 2. Each county road supervisor, district road supervisor, and board of the county commissioners in this State is charged with the duty of notifying the owner or occupant of any lands or premises upon which any of the noxious weeds mentioned in Section 1 of this act exist, of the existence thereof on such lands or premises, and the board of the county commissioners of any county may designate any county or district officers within their county, or any suitable person or persons therein, to give such notice, which shall be in such form, of such substance and purport as shall give effectual notice of the existence of the noxious weed or weeds to owner or occupant of the land or premises on which the same exists, and such board may allow such reasonable compensation, not exceeding three dollars per day for each day necessarily and actually employed by such officer or person so designated in the performance of such duty.

SEC. 3. Any person, company, association of persons or corporation mentioned in Section 1 of this act, who shall fail or refuse to destroy or cause to be destroyed any of the noxious weeds mentioned in this act on any lands or premises owned, used, leased, occupied or controlled by such persons, association of persons or corporation, including rights of way used, occupied or controlled by them, or either of them, after knowledge of the existence of any such noxious weeds on such lands or premises, shall be guilty of a misdemeanor, and, upon conviction thereof, shall be fined in any sum not to exceed five dollars for each day that any such noxious weeds shall remain living on the lands or premises owned, used, occupied, leased or controlled by such person, association of persons or corporation after the knowledge of the existence thereof or of notice of the existence thereof. The notice of the existence of any of such noxious weeds may be such as is required to be given by this act, or any notice, either oral or written, given by any person to the owner or occupant of lands or premises upon which such noxious weed or weeds exist, of the existence of the same.

Approved February 26, A. D. 1895.