Two noxious weeds.

L. H. Pammel
Iowa State College
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During the last few years the writer has received numerous requests to identify weeds; among them are two conspicuous, because of their frequency in many parts of Iowa. The question seemed sufficiently important that last fall a press bulletin was sent out, describing these weeds and several others. The press bulletin was widely copied by our local papers and many responses came in. These weeds are so widely distributed in Iowa that a short account of these will be of service to Iowa farmers.

PRICKLY LETTUCE. (Lactuca scariola)

Last year much interest was manifested in the appearance of Prickly Lettuce in western states particularly Illinois, Iowa and Indiana, so much so, that Dr. J. C. Arthur of the Indiana Station, has published an extended account. Prof. Morrow also issued a press bulletin.

Description:—Tall, erect herbs, glaucus green, two to six feet high, simple or branched except the lower part of stem which has stiff bristles. Leaves glaucus, green, smooth except the midrib which is beset with weak prickles; lanceolate to oblong in outline with spinulose dentate margins occasionally sinuate toothed.

Dr. Gray says sometimes pinnatifid, but such leaves have not been observed here: base sagittate-clasping. Leaves becoming vertical by a twist. It is therefore one of the compass plants. In shady situations the leaves are not twisted. Flowers produced in small heads; these occur in open panicles. Each head has from four to eighteen yellow flowers, Akenes flat, striate nerved obovate oblong, produced into a long filiform beak, the latter is paler in color than the akenes. The pappus consists of a delicate white down, the separate parts arise at the end of the beak. The whole arrangement of the akenes is a contrivance for scattering the seed. As to duration Prickly Lettuce is an annual or generally a winter annual. This condition depends some-
PLATE I.

PRICKLY LETTUCE (Lactuca scariola). Two views of the plant, showing compass-like habit of the leaves. Kindly loaned by Dr Arthur of the Indiana Agricultural Experiment Station.
what on the state of the weather in the fall. Last fall thousands of little plants were seen everywhere in Central Iowa. All parts of the plant contain a milky juice, the latter occurs in plants of widely separated families, as Milkweed (*Asclepias syriaca*) Opium plant (*Papaver somniferum*) etc.

**Relationship of the Plant:** This weed is undoubtedly closely related to our cultivated lettuce (*Lactuca sativa*) and as Dr. Arthur says most closely resembles the Cos varieties of lettuce. Prof. Bailey indeed considers that our cultivated lettuce originated from this plant. DeCandolle† says:

"Botanists are agreed in considering the cultivated lettuce as a modification of the wild species called *Lactuca Scariola*. The cultivated lettuce often spreads from gardens and sows itself in the open country. No one as far as I know, has observed it in such a case for several generations, or has tried to cultivate the wild *L. Scariola* to see whether the transition is easy from the one to the other." Some years ago the writer collected in a waste place in western Wisconsin escaped specimens of the cultivated lettuce, while the stem at its base had bristles, the leaves in no way resembled our prickly lettuce in outline, and the bristles on midrib. We may therefore regard our plant as a good species and the cultivated form as a variety. Several distinct wild species of lettuce occur throughout Iowa. None however are troublesome to the farmer. Some of these go by the common name of Fire weed. All of these plants are members of the Sunflower family and known botanically as **Compositae**.

**DISTRIBUTION:**—Prickly Lettuce is a native of temperate and Southern Europe, Canary Islands, Madera, Algeria, Abassynia and temperate regions of eastern Asia. It was introduced into North America about 1863. Collected by Mr. D. Murray in 1863 and 1864 and was first reported by Dr. Gray.‡

Since then it has become very common in the eastern states and in the Mississippi valley north of Arkansas spreading westward to the Pacific coast by way of Montana and Idaho.§ It has taken a quarter of a century for the weed to become numerous, but isolated specimens in the Mississippi valley were reported 15 and 19 years ago. Now it is alllmost beyond control. The writer in 1887 called attention to the weedy nature of this plant and advised its extermination.

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+Origin of cultivated plants, p 95.
2Gray’s Manual of Botany 1867.
3The writer has recently observed it in Denver, Fort Collins and Golden, Colorado. Also in Hastings, Crete and Lincoln, Nebraska.
PLATE II.

Prickly Lettuce (*Lactuca scariola*) which had been mowed off shows how branches start near the base. Cut kindly loaned by Dr. Arthur of the Indiana Agricultural Experiment Station.
*Mr. G. P. Clinton says: "Perhaps no plant has attracted more attention by its apparently very rapid spread than has this during the past two or three years. It is said that the plant was introduced into this country from Europe, the first specimen being found at Cambridge, Mass. in 1863. In this state, while too many it appears as a new weed, it has been observed in several localities for a number of years. Dr. W. S. Moffatt in a letter states that he has known the plant to occur in the vicinity of Chicago for at least fifteen years, and as early as 1879 plants were collected at Rockford by Mr. M. S. Bebb. At the present time the plant is one of the most common in waste places. It belongs to the composite family, and is thought by some to be a wild form of cultivated lettuce to which at least it bears close relationship. The seeds begin to germinate either in the fall or early spring and at first form a circle of leaves spreading flat on the ground."

Prof. Arthur well says: "Here is a vigorous weed almost as common as ragweed, and bidding fair to become common everywhere, with no strong features to catch the eye, so that unless in masses it escapes notice until attention is called to it, and with unrivalled fertility and means of dispersion. Prof. Morrow thinks that where common it will require "concerted action of farmers, road commissioners and owners of village lots" to check its further spread, with which we agree; and furthermore, we believe that if this concerted action were brought about all over the country, and continued without interruption for a term of years, some hope of extermination could be entertained, but not otherwise. But concerted action of so large a number of citizens throughout the whole country was never yet secured for any object whatever, and to base any scheme upon such a contingent is little short of absurd, and at best is visionary and doomed to failure. Mr. Clinton must have felt this when impelled to make a dampening commentary upon his own advice to farmers; 'The best method of destruction, he says, 'is in preventing it from seeding,' but immediately adds that "this however will do no good unless carried on all over the country." What shall the poor farmer do? He seems to be between Scylla and Charybdis. He must either stand by and see his land usurped by a vigorous foreigner, or he must knowingly fight the foreigner to no purpose, because all other land tillers and owners are not of a mind to fight at the same time. Mr. Wheeler evidently saw something of the magnitude of the undertaking which he urged, when he

*Prairie Farmer Jan. 29, 1888.
†Bull. No. 89, Illinois Agricultural Experiment Station.
put these words at the end of his advice to farmers: "United effort and eternal vigilance on the part of all land owners will be required to stop the spreading of the pest." It is scarcely to be believed that he seriously anticipated any such zeal on the part of land owners. It may be that a million dollars, judiciously expended by the general government would not exterminate the Russian thistle from American soil, but it is doubtful if any available number of millions could bring about the extermination of the wild lettuce."

We cannot here dwell on the distribution of the weed, but must refer the reader to Arthur's excellent account, and a paper by the writer in Volume II p. 109 of the Proceedings Iowa Academy of Sciences. In Iowa it is common from Dubuque west to Webster City, south-west to Atlantic and to the western line of the state.

WHAT SHALL BE DONE WITH THE WEED: The weed is easily exterminated by cutting off young plants below the ground in cultivated fields and waste places. Where the stem is cut off below the surface of the ground it will occasion no trouble, but in meadows and lawns where the plants are cut off above the ground the weed will continually reappear producing from three to half a dozen branches. The following excellent suggestions are made by L. H. Dewey.

"Weeds and how to kill them." Farmers' Bulletin No. 28 U. S. Dept. of Agriculture.

Sheep and sometimes cattle will eat the young prickly lettuce, and in some localities their services have been found very effective in keeping it down, especially in recently cleared land where thorough cultivation is impossible. Repeatedly mowing the plants as they first begin to blossom will prevent seeding and eventually subdue them. Thorough cultivation with a hoed crop, by means of which the seed in the soil may be induced to germinate, will be found most effective. The first plowing should be shallow, so as not to bury the seeds too deep. Under no circumstances should the mature seed-bearing plants be plowed under, as that would only fill the soil with seeds buried at different depths to be brought under conditions favorable for germination at intervals for several years. Mature plants should be mowed and burned before plowing. The seed appears as an impurity in clover, millet, and the heavier grass seeds, and the plant is doubtless most frequently introduced by this means. As the seeds may be carried a long distance by the wind, the plants must be cleared out of the fence rows, waste land, and roadsides.
BUFFALO-BUR. \textit{(Solanum rostratum) Dunal}

Last season numerous requests were received to identify certain weeds. The most abundant of these was Spiny Nightshade or Buffalo Bur \textit{(Solanum rostratum Dunal)}. We would suggest the common name Buffalo Bur, be used. This weed seems to have attracted unusual attention last year because of the prickly nature of its fruit, stems and leaves so much so that farmers usually thought it was the Russian thistle. It has however no resemblance to this weed, the two being very different. A full description and account of the Russian thistle is given in Bulletin 26 of the Experiment Station. Buffalo Bur is by

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\textbf{PLATE III.}
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Buffalo Bur \textit{(Solanum rostratum)} showing prickly burs and general habit of plant, natural size. Cut kindly loaned by Illinois Agricultural Experiment Station.
no means a new weed for the state. It probably occurred in the western part of Iowa before the country was settled. Cultivation of the soil, has however, brought it into prominence.

DESCRIPTION: Herbaceous, woody when old, somewhat hoary or yellowish, eight inches to two feet high covered with a copious stellate, pubescence, The branches and main stems when it begins to branch are covered with yellow sharp prickles. Leaves somewhat melon like, one to three times pinnatifid, lobes roundish or obtuse and repand, covered with the soft pubescence, hairs stellate. Flowers yellow, corolla gamopetalous about an inch in diameter, nearly regular, the sharp lobes of the corolla broadly ovate. Stamens, five, declined, anthers tapering upwards, linear lanceolate, dissimilar; the lowest much larger and longer with an incurved beak, hence the technical name *rostratum*, Style much declined. Fruit a berry but enclosed by the close-fitting and prickly calyx, which has suggested the common name Buffalo Bur. Pedicels in fruit erect. Seeds thick, irregular, round or somewhat longer than broad, wrinkled showing numerous small pits; seeds surrounded by a

Buffalo Bur (*Solanum rostratum*). Showing prickly burs and general habit of plant, figure reduced. Cut kindly loaned by Illinois Agricultural Experiment Station.
Figure 1. Buffalo Bur (*Solanum rostratum*) in flower. To the right seeds natural size enlarged, showing pits. To the left, burs. Drawn by Miss Charlotte M. King and Miss Nettie Fibbs.
mucilaginous substance. Microscopically the seed consists of a peculiar outer layer of cells having conical projections; the common wall meeting at the outer edge. The conical projections are lighter brown than the lower part of cell-wall. The cell cavity occupies a relatively larger area between the conical projections. *Harz and Moeller state that the layers of cells following the parenchyma cells in Capsicum and Solanum at first consist of parenchyma cells. but these later are very much compressed. They can only be made out when treated with the potash. They are however readily made out in sections mounted in water, one or two layers being very evident. The seed coats are followed by the endosperm of the seed. The thick walled outer cells as well as those of the interior of the endosperm are filled with protein grains.

Relationship of the Plant:—This plant belongs to the order Solanaceae, or Night-shade Family. Well known representatives of the family are the potato and tomato. It contains several quite troublesome weeds like the Horse Nettle (Solanum Carolinense) and the rapidly spreading north-western weed Solanum triflorum. Several members of the family are medicinal plants like Henbane Hyoscyamus niger and Belladona (Atropa Belladonna).

Distribution: The Buffalo Bur was undoubtedly a native to the regions of the plains occurring in barren places where grass is scant, and in former times was most abundant around the so-called 'Buffalo wallows.' Prof. Henry says: "When I was in Colorado from 1873-1876 I found Solanum rostratum growing almost everywhere on the plains in the vicinity of Denver." Its range is from New Mexico to Wyoming and across the plains. The general traffic from the west to east has caused the weed to be distributed in various eastern and middle states, Iowa, Minnesota, Wisconsin, Missouri, Illinois, Indiana, Ohio, New York, Massachusetts, Tennessee. The weed has been found in Germany and has occasioned some alarm. The writer found this weed at Watertown, Wisconsin in 1887 and since then reports of its occurrence in eastern states have become more frequent. Dr. Byron D. Halsted reported this weed in central Iowa in 1887.

The writer reported this weed from Chariton, Iowa. and Elmira, Ill. in 1890 and 1892.

It is undoubtedly one of the most troublesome weeds with which the farmer comes in contact in parts of the West and Southwest as is well known to all who have visited Texas, Colorado and Kansas.

The writer in commenting on this weed says:—

American Agriculturist Vol. 50, page 387.

In Texas it is a most striking weed along the roadsides and in fields. It is so aggressive as to kill out all other plants especially in the streets of villages and cities. Cattle carefully avoid it. Even in pastures and meadows where much tramping is done this weed is a very aggressive one. Prof. C. S. Crandall writes me as follows; "My first acquaintance with the plant dates from 1890 when I went to Colorado. It was then spoken of as a bad weed by farmers and, I presume has been known as such since farming began in Colorado. It is more troublesome some years than others, as only a small portion of the seed matures."

Mr. G. P. Clinton,* of Illinois, says concerning this weed:—"The native home of this plant is the plains of the west. For years, however, it has gradually been working its way eastward. Its first appearance in this state seems to have been in Adams county, specimens having been collected on waste ground at Camp Point in August of 1878. It has since been reported from a number of widely separated localities, and at one place near Eagle Point, Ogle county, has taken possession of several acres of land. Like the horse-nettle, the sand-bur belongs to the nightshade family. It forms a branched plant one or two feet high, and presents a striking appearance because of the stout yellow prickles which densely cover the stems, leaves and fruit. The flowers are yellow, about an inch in diameter, and at maturity produce numerous seeds. It is one of our annual plants. Before the introduction of the potato in the west the sand-bur is said to have formed the chief food of the potato-bugs there. Although as yet the plant has not caused much trouble here, it is one to be regarded as quite undesirable because of the liberal manner in which nature has armed it."

We have given the distribution of this weed quite fully in the Report of the Iowa Academy of Science, Vol. II, p. 114 which the reader may consult. But we here insert the distribution of the weed as reported to me from Iowa correspondents:


Figure 2. Single small plant of Buffalo Bur, showing spines on stems and fruit. From a photograph by C. B. Weaver; drawn by Charlotte M. King.


Found in the state in 1894 as follows, Ainsworth, (J. H. Pearson) Ames, (Tilden Boone, (V. O. Holcomb.) Burwick, (Sylvester Snyder.)
Buffalo Bur. A, seed coats; B, Conical projections; E, Endosperm; all greatly magnified.


Of the numerous letters we have received in regard to the pestiferous character of this weed, we insert the following from Mr. Charles
Ashton of Guthrie Center. "The weed grew on the southwest side of the track on the sloping bank and in a pile of rotted manure that Mr. Mitchell saw thrown out of a stock car last March, so that it had favorable conditions to its large spread. The thing grew not more than four rods from the street leading west from this town and just beyond the western extremity of the town. It being the second day of the County Fair and about 8 o'clock a.m. a number of people were passing on their way to the fair grounds across the river west of town, I called Mr. Frank Dilley, a carpenter to my assistance with his rule and obtaining a pole we carefully in the presence of a number of spectators measured its horizontal dimensions. Its height could not have been more than 18 inches. In its longest extent it reached 6 feet, 3 inches; in its greatest breadth, 5 feet 9 inches. By consent of Messrs. McDonald and Thomas, the president and Secretary of the Agricultural society I had the plant carefully dug up and placed on a large rug and put on exhibition in floral hall, as the monster was then profusely in bloom. Its rich green leaves and yellow blossoms making quite a showing. Its horizontal burs and thorny stems, especially after the leaves and blossoms had wilted, which they did effectually the first day, made it a repulsive looking thing. I let it lie two days on the table in that hall so that our citizens from all parts of the county might have a sight of the noxious weed. On Friday morning Mr. E. G. Stowell and myself separated the branches from the stock and carefully counted the burs formed and growing thereon; they reached the aggregate of 1985. We opened one bur and counted the seeds it contained, and found them to number 66. Averaging the number even at thirty should the burs then formed on the plant mature the seeds produced would aggregate 59,550, certainly a production showing vast multiplying powers. The leaves had strong resemblance to the leaf of a potato. The blossoms were about the size of a potato blossom, perhaps slightly larger. The inside of the flower very much the same to the eye as the interior of the bloom of the potato." Mr. Carver found one specimen in a creek bottom here at Ames fully as large as Mr. Ashton's plant.

On the abundance of this weed I may state that I saw the weeds numerous in the streets of Creston last winter and it is especially common in the south-western part of the state. I am further convinced that unless the farmers will speedily destroy the plants we may expect fully as much trouble from this weed as the Russian thistle. It delights to grow in our cultivated soils. This weed seems to be scattered
in two ways; one by means of stock trains and the other with garden seeds. The occurrence of the weed in gardens so frequently in Iowa, leads me to believe that this weed has been disseminated in our state more especially by the latter method. I wish to emphasize in this connection the importance of using care in the purchase of seed. The Experiment Station is willing at all times to make an examination of seeds to detect weed seeds.

**Extermination of the Weed.** In as much as this weed is an annual it can easily be exterminated by cutting off the young plants below the ground and this should be done before the pods are formed. If the plants are older they should be cut off and burned.

**City Authorities Should Give More Attention to the Destruction of Weeds.**

In the majority of cases the farmer is held responsible for the in-

A, B and C Stellate hairs; B, lower view; A, upper view; A and B more magnified than than C. In the latter the branches are shown. A, drawn by Miss King.
troduction of weeds. City people comment on the weeds that occur around the farmer's buildings, along fences and in general on the weeds that occur on the farmer's premises. Too often weeds are left to grow unchecked by the farmer and he deserves criticism. The railroads receive their share of criticism and in some cases justly too, but in many cases, at least as far as my observations have extended the railroads are not slow to remove the weeds along their tracks. There is a surprising amount of laxity shown by city authorities in removing weeds in the streets. It is seldom indeed that the scythe or mower are applied to the weeds along the streets. The Prickly Lettuce here in Ames was observed in streets in 1889, very little of it was found in the country and in well kept gardens and lawns, now however it is just as abundant in the country as it is in the city. Last fall I had occasion to do some botanizing near Des Moines. On my way I passed through a portion of the city near Coon river. Here I found the Jimson weed, Sunflower, Cocklebur, Prickly Lettuce, growing up around the poorly constructed houses; enough seed produced here to seed the whole city with noxious weeds. The history of the Russian thistle shows that it has been most abundant in our cities and from there has spread to the country, as in Sioux City, Sioux Falls, etc. These are not the only illustrations, other cities are equally as bad. I would suggest that city authorities could do no better than to employ vagrants to annually remove these weeds instead of putting the unemployed on the stone pile. The loss of crops from the growth of weeds to the farmer amounts to many millions of dollars and in justice to the whole community these should not be tolerated in the city any more than in the country.